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TO OUR SUBSCRIBERS

In the interest of the conservation of paper which the War Industries Board is requesting, the Railway Maintenance Engineer will print at the end of the year only a sufficient number of indexes of the 1918 volume to meet direct requests from its subscribers. It is requested, therefore, that those desiring indexes advise the Chicago office 608 South Dearborn street, at the earliest practicable date, so that the requisite number of indexes can be printed and mailed to those requesting them.

Wm. G. McAdoo Resigns as Director-General

William G. McAdoo has resigned as director general of railroads, as announced on another page. This action came as a distinct surprise to railway men. While many are inclined to take at its full value his statement that he was led to take this step by ill health and a desire to recoup his financial resources, others believe that it was prompted by deeper causes and that serious differences of opinion have developed between him and the President relative to the future policy of government control of the railroads and other public utilities. It has been stated that the President is desirous of extending and strengthening federal control over many utilities as a permanent policy and that the director general differed with him in this respect. While the complete facts are not available at the time we go to press, the uncertainty which has been injected into the railway organization within the past few days illustrates one of the dangers of permanent government control.

The Volume of Maintenance Painting

Attention is directed to the report of the convention of the Maintenance of Way Master Painters appearing on another page of this issue, in which will be found the result of an investigation to determine a measure of the volume of maintenance of way painting done by the railroads of the United States. While the information given in this report is necessarily approximate because of the limited data upon which it is based, it represents what is believed to be the most complete information available on this subject. The figures there given, which are for the calendar year 1917, show that the amount of money expended for maintenance of way painting is approximately $11,000,000, of which about $7,500,000 was expended for labor and $3,500,000 for material. During 1918 there was, of course, an increase in the unit costs of both of these items, but it is doubtful if the relation between the two was changed materially. The direct benefit to be derived from this expenditure of $11,000,000, which was undoubtedly greater during 1918, depends upon the permanence of the work done. Just as this expenditure is divided into two component parts, material and the labor, so the relative effectiveness of the results depend upon the quality of these two factors. Improvements in the labor, effected by the employment of more efficient workmen and the exercise of more intelligent supervision, will produce more lasting results in the application of paint, and no doubt there is room for considerable progress in this regard. But the real opportunity for improving results is in the quality of the materials used, that is, by buying better and there-

fore usually more expensive paints. However, since the cost of the materials represents only one-third of the total cost of the work, a percentage of increase in the cost of materials will represent only one-third as large a percentage in the total cost of the work. While railroads generally have been using high-grade materials, there are cases where higher quality materials might have been used with economy. This is a matter for serious study.

THE DAWN OF PEACE

PEACE HAS COME and with it an era of new conditions which bear so marked a contrast to the circumstances accompanying the state of war that a critical period of transition must elapse before the normal life of the country and all its industrial activities can be restored. Some of the changes will take place slowly, but there are now plenty of evidences that a readjustment is already in progress. In the case of the material and labor markets an instantaneous and most pronounced change took place virtually with the signing of the armistice. The last stroke of the pen relieved the United States War Industry Board of a mighty problem—that of satisfying the enormous demands for steel with an inadequate supply. So also with the labor situation. On November 10 the task was to find a man for every job, while on November 11 it became one of finding a job for every man.

The fact that these marked changes have not been manifested by sudden increases in the supplies of material and labor, lies in an appreciation of the immensity of the problem and a realization of the necessity for proceeding slowly. It would be disastrous to glut the market at once with a large number of men looking for jobs or with great quantities of materials that had been intended for war purposes. The situation is one of profound potentialities which must be met in the near future.

One thing is certain—that there will be plenty of material and labor for the railroads and herein lies a great boon for them and for the men who have striven through the years of inadequate supplies of both men and materials to make the most of the meager resources at hand. In the maintenance of way field particularly, camps, working conditions and methods of employment have been improved to attract the few men available, an impetus has been given to labor-saving machinery far beyond the expectations of previous years and ingenuity has had free play in making substitutions of available materials for those not to be had. In other words, stress of necessity has forced the railroad man to do what he should have done of his own volition. Like nations which derive a renewed vigor and spirit through participation in war, men have developed increased resourcefulness and enhanced capacity for work. Peace is now at hand and with it comes opportunities for increased productiveness and greater efficiency if the lessons taught by the war are not too soon forgotten.

CHASING SNOW FLAKES

ONE OF THE OBJECTIONS which has been raised against the permanent employment of maintenance labor, particularly in track work, has been that of the impracticability of keeping the men so held busy on constructive work during the winter. It must be admitted that as the forces are now handled on many roads, the men spend a large part of their time "chasing snow flakes" and in other similarly unproductive duties. A certain amount of work without permanent benefits, such as the sweeping of snow from switches, etc., is required during the winter, although in many instances more time than is necessary is spent on such duties, giving rise to the criticism referred to above. However, there is much constructive maintenance work which can also be done during the winter if the foremen learn to take advantage of their opportunities. The tightening of bolts and the gaging of track are typical of work which can be done almost as well then as in the summer and their completion at this season relieves the forces for other work when the frost is out of the ground. Supervisors can do well to analyze in detail the work their forces are called on to perform and to study local conditions to determine what part can properly be done during the winter, transmitting the results of these studies to their foremen and seeing that they take advantage of all opportunities to handle such work. The return in productive work per dollar expended for labor during the winter months can be increased materially over that now obtained.

Of even greater importance at the present time, the forces can be employed on other work next summer which might not otherwise be possible. The same condition applies to a considerable extent in bridge and building work and with painting gangs. The principal reason for the seasonal employment of maintenance men has been the failure of the supervising officers to consider the extent to which work can be conducted economically in the winter time. Under present conditions this subject is of primary importance to all men in the maintenance department, from the foreman to the engineer maintenance of way. The foreman who employs his men to the best advantage on constructive work this winter will suffer less from the shortage of help next summer and his track will be in the best condition.

RECLAMATION MUST GO ON

THE NECESSITY for pushing the war to an early and successful conclusion created an enormous demand for war materials which culminated in the last few months of the great conflict in a most profound shortage of all supplies used to any extent in the conduct of warfare. This shortage, particularly in the case of steel and iron, became more acute with the increasing military activities of this country, so that the situation had to be met by the creation of the Priorities Committee which instituted a system of curtailment in the delivery of materials to domestic users. This applied not only to those classed as non-essential, but also to such necessary factors in the prosecution of the war as were the railroads.

As a result of this, an impetus was given to the conservation and reclamation of materials which far exceeded the efforts along this line pursued under peace conditions for purposes of economy, for, as expressed repeatedly in these columns, conservation had ceased to be a matter of mere economy, but had become one of absolute necessity. It became of importance to save steel, even if the cost of reclamation exceeded the normal value of the materials reclaimed. Railway men were given to understand that they could promote the military activities of the country no more effectively than by making every unit of material render its maximum service.

The situation brought about by the war extended the scope of reclamation activities far beyond that of peace times. Some roads had long been practicing conservation and reclamation with most profitable results, but the practice had been far from uniform. Where one road was obtaining a good return from the restoration of certain devices to service at small expenditures, others were releasing the materials to scrap dealers at prevailing scrap

prices and one case is reported where a second road brought material thus sold to a dealer and reclaimed it at a definite saving. However, war conditions had done much to overcome this situation and a renewed interest was being taken in reclamation processes. Many roads were extending their activities along this line and those that had limited facilities were taking steps to introduce economies of this kind. The situation was, therefore, one of great promise for the railroads. In other words, they were being forced to do what they should have done of their own volition in peace times.

Now that peace is at hand and the necessity for economy in the use of steel as a war measure has been largely removed, there is a danger that the advantages of the careful and conscientious reclamation of all materials released from service will be largely lost by a decreasing enthusiasm in the work. To avoid this there must be no lessening in the educational work which has been so largely responsible for the results produced thus far. The war has taught us the advantages of educational measures and such work must continue. The men must be taught that even in times of peace economy in the use of materials is just as important as the efficient performance of the full day's work.

COMPARING MAINTENANCE STANDARDS

ON WHAT BASIS can one compare standards of maintenance? The legislation under which the government is now operating the railroads stipulates that they shall be returned to their owners at the termination of the period of federal control in as good condition as when taken over on December 28, 1917. One of the problems confronting the representatives of the roads and of the Railroad Administration is to determine whether the properties are being maintained to their previous standards and if not, what work is necessary to bring them up to those standards. The engineering assistant to the chief of the Division of Operation and his committee of engineering assistants to the regional directors are now preparing standards of measurements for use in making these comparisons between the work done in 1918 and that during the three preceding fiscal years, the period specified in the law.

Obviously it is necessary that all measurements be made in units of work done rather than in dollars of expenditures for the purchasing power of the dollar has decreased greatly during recent months. In so far as the renewal of units of property, such as ties, rails and tie plates is concerned, such measurements are accurate. More difficulty will be encountered in measuring labor charges. Much of the work of maintaining tracks and structures results in little other than labor charges as in the surfacing of track and the lining of bridges. It is, of course, possible to compare labor charges on the basis of man-days of work performed, but even such comparison is now inaccurate and will result to the disadvantage of the carriers at the present time because of the greatly decreased efficiency of the labor employed this year as compared with past seasons.

Another element which must be considered is that of traffic. Many changes in the routing of business have been brought about by federal control. Passenger traffic has been concentrated on certain lines largely to the exclusion of others. Freight has been moved over short lines and those of lighter grades, while certain roads have been given over largely to coal and similar traffic. Changes in the ratio of passenger and of fast and drag freight trains as well as in the aggregate tonnage handled affect the wear and tear on the property and must be compensated for. Certain items of maintenance, such as the repair of fences and the policing of the right of way are affected little, if any, by traffic, while others are influenced in varying degrees. All these must be considered in determining the amount of maintenance necessary to hold the property in the condition in which it was taken over.

These considerations indicate the complex character of the problem to be solved. Because of the difficulty in arriving at an accurate measure of many of the elements entering into the question the impossibility of developing a definite formula which can be applied to any road or portion of a property with any degree of accuracy is evident. It is understood to be the desire of the officers of the Railroad Administration to agree on as many of these points as possible with the representatives of the carriers and in this way to reduce the points of difference to a minimum. This would appear to be the logical way to arrive at a decision without unnecessary delay and possible litigation.

THE CHANGED STEEL SITUATION

THE SIGNING of the armistice on November 11 brought about many marked changes in this country, but none was more radical than the effect in the steel industry. One year ago the mills were so entirely occupied by the manufacture of war materials for the Allies at unheard-of prices that the American railroads, with other domestic purchasers, experienced great difficulty in securing their requirements. Following the taking over of the railroads by the government and the fixing of prices and the establishment of priorities for steel, the status of the railroad purchasers improved greatly, for they were given a priority rank over many other consumers.

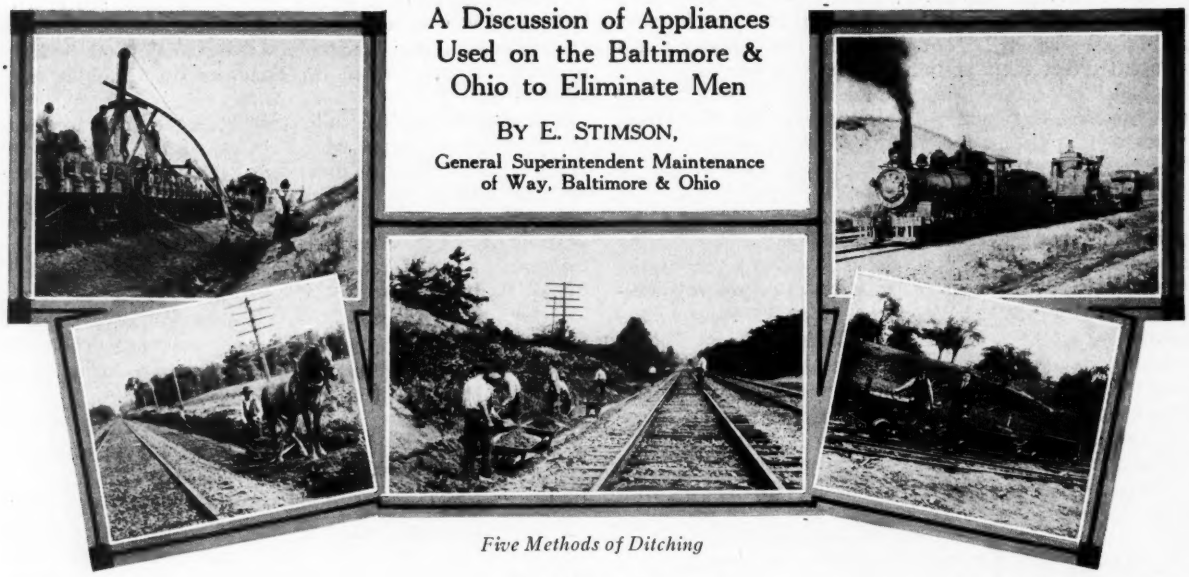
Nevertheless, their position was subordinate to that of the army, the navy and the shipping board, and as the shortage of steel became more acute with the increasing demands of these preferred organizations towards the close of the war, the railroads were forced to do without steel for many purposes for which it had formerly been considered a necessity. For instance, the delivery of rails during the past year has been reduced to less than 40 per cent of normal, while similar restrictions have been placed on the use of structural steel for bridges, etc. Again, only a short time ago the Priorities committee called the attention of the roads to the fact that no requests for steel water tanks would be granted and as a result some roads have gone to wood, while at least one of the regional directors started an investigation to determine the possibility of substituting concrete construction. This is typical of the conditions prevailing throughout the railroad industry, preceding the signing of the armistice.

With the conclusion of hostilities the demands for munitions has largely ceased, while the requirements for allied military activities have shown marked diminution. As a result the Priorities committee has already advised the regional directors that restrictions as to the use of steel have been removed and that there are now no limitations on the use of construction materials in railway projects, while orders for steel water tanks have been specifically approved. Although the present outlook is that the existing high prices for steel will be maintained for some time it is now available at these prices, a condition which did not exist a month ago. The consideration governing the selection of alternate form of construction is now, therefore, based upon motives of relative economy.

LABOR SAVING DEVICES FOR TRACK MAINTENANCE*

A Discussion of Appliances Used on the Baltimore & Ohio to Eliminate Men

BY E. STIMSON,
General Superintendent Maintenance of Way, Baltimore & Ohio



Five Methods of Ditching

A Ditching Machine Ditching with Scrapers — *Ditching by Hand* — *A Steam Ditcher and Train Motor Car in Ditching Service*

LABOR IS THE LARGEST single item of maintenance of way and structure expense. For normal maintenance it is as much and often more than all the other items combined, as it averages from 50 to 55 per cent.

Until quite recently the problem was to get the greatest performance per unit of labor, there being a sufficient supply of labor units to meet the demand. We have been confronted with another factor in the problem, an insufficient supply of labor. To overcome this shortage resort is to be had to labor-saving devices, machines to take the place of men. Many of these have been developed and in use for a number of years and were inspired by the desire for economy; that is, to save dollars. A new incentive for their use has been introduced, to save men, even though there may be no saving in dollars, as is instanced in cases where capital investment and high operating cost offset the saving in men. These instances are, however, rare.

The steam shovel with the attendant flat cars, plows, Lidgerwood unloaders, spreaders, or dump cars was, perhaps, the first great labor-saving device used on railroads, and is the greatest of all. It made possible the rapid construction and expansion of the American railways and has in itself and with its modification, the steam ditchers, assisted in their maintenance.

The first ditching machine of which I have knowledge was developed on the Illinois division of the Baltimore & Ohio, about 20 years ago, and was called the "Mahoney Ditcher." The first machine was built at the company's shop, and was in use for a number of years. This ditcher is best adapted to work of cleaning out or restoring ditches in standard width cuts. The bucket is shaped to the ditch, leaving it in the finished form with a minimum removal of material. The capacity is about 30 cu. yd. per hour with a full complement of 5 men.

About the time the "Mahoney Ditcher" was brought out, one of another type appeared, namely, a small steam shovel mounted on skids and pulled from car to car along a train of flats by a Lidgerwood unloader. This machine was suited for widening cuts, removing slides, but was not flexible enough in movement to form a finished ditch. It was called the "Barnhart Ditcher." It was the forerunner of the modern steam ditchers of the "American" and "Barnhart" types. Steel air dump cars of about 16 cu. yd. capacity with a spreader car form the ideal equipment to use with these ditchers. This type of ditcher is well adapted to the uses of a steam derrick within the limits of its lifting capacity, and is of great use in unloading and loading rail, ties, timbers, etc. With a clam shell bucket substituted for the dipper arm its uses are still further extended.

Each of these various uses of this machine results in a great saving in man-power, the best example being that of ditching. The loading capacity per hour is about 60 cu. yd. in ordinary material. It would require 100 men to load this amount by hand. As it requires but 5 men to operate the ditcher the large saving is evident. In handling rail 6 men and the machine will readily do the work of 40 men.

In connection with the ditchers there have been mentioned the Lidgerwood unloaders and the plows and spreaders to unload the materials from the cars and spread them away from the track. These are used to best advantage with flat cars, but can also be used with flat bottom, side dump cars. Air dump cars used where the haul is short are economical, requiring a smaller engine for handling and no unloader. They save the time required for switching the plow each time to the rear of the train and the stretching of the cable over the cars, and, not the least important, keep the flat cars in revenue service.

In addition to the equipment for ditching already mentioned there are several good types of steel constructed spreader cars with the wings operated by air which level down and spread out the material dumped from the cars. Two men with a work train crew operate these machines. There is also a type of spreader having, in

*Abstracted from a paper presented before the New England Railroad Club, Boston.

addition to the long main wing, a short wing in the rear used as a ballast section and roadbed shaper which is a great labor saver where cinders, granulated slag or gravel is used as ballast. These spreader cars are also adaptable for use as snow flangers, as plows and for spreading ballast.

Devices and methods of eliminating work train service in ditching are necessary and often imperative under present conditions. A steel side dump ditching car which is built at the company shops is used for this purpose. It operates on a 22-in. gage track laid directly over the ditch. The car is built low and narrow so as to clear trains in narrow cuts. The capacity of the car is ¾ cu. yd. and can easily be handled loaded by two men. The material loaded is taken to the end of the cut and used for bank widening or is wasted. Where the work is heavy and the haul long, two and sometimes three cars are handled in trains by a motor car. With this method a larger gang is employed and a switch is put in at the end of the cut so two trains of cars can be handled, one loading while the other is being taken out for dumping.

Horses furnish another means of saving work train service. We have found that, including plowing, a one-horse scoop and driver working in a clay cut averaging 4 ft. in height, and wasting the material on top of the cut, can handle 45 cu. yd. in 9 hours. Another man is required for dressing up the ditch. The two men and one horse, therefore, do the work of at least 10 men. Up to a 300 ft. haul the wheelbarrow is a good proposition as compared with other methods. While these methods may not show great economies over the steam ditcher and work train, and do require much greater time for completion, they are to be recommended where the matter of quick completion is not vital. They require but a small number of men and give steady employment, a promoter of efficiency. With the intense traffic conditions prevailing and the great demand for train crews and engines to handle the business it is most desirable to release all the work train service possible. The cost of this service has increased about 40 per cent during the past year and nearly 100 per cent in the past 10 years. These considerations make it desirable, both from necessity and from the standpoint of economy, to adopt methods to reduce work train service.

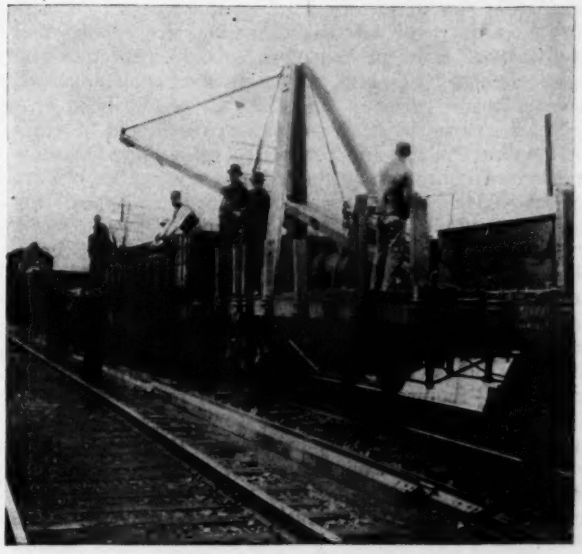
A home-made device which has proven a great labor-saver is an air-operated rail handler. With it a gang of six men and a foreman will load one rail per minute. By hand methods 20 men will load one rail every 2 min. on to flat cars and one rail every 5½ min. on gondolas. The machine is also used for handling frogs, switches, ties, scrap and other maintenance materials with proportionate labor savings.

More labor is used in surfacing and lining of track than on any other item of track work. Normally this will amount to about 35 per cent of the total track payroll. This offers an attractive field for labor saving. About four years ago pneumatic tie tamping machines were introduced for this work. The earlier machines were limited to two tampers, but the later ones have the necessary power to operate four tampers with a consequent reduction in overhead and operating expenses. Our experience indicates that with a 2-tool machine 5 men do the work of 9 men tamping with picks and with a 4-tool machine 7 men will do the work of 17 men without them. There is also an indirect saving made by the more uniform and permanent work done by the tamper, requiring less frequent re-tamping than when the work is done by hand.

Stone ballast, to be fully effective, must be kept clean and the voids unclogged. Otherwise a dusty track results in dry weather and a poorly draining ballast with pumping joints in wet weather. With the coming of the heavy, modern engines equipped with stokers, hopper ash pans whose slides rarely are closed, and self-cleaning front ends, hauling maximum tonnage, and requiring the use of much sand, the keeping of stone ballast clean has become a difficult matter. Where traffic is heavy, particularly on grades, stone ballast, under such conditions, will require cleaning at least once in three years and in many places much oftener. To raise the track on dirty ballast and dress off with clean stone is poor practice, and to clean it by forking it over is slow, expensive, and requires a large number of men.

A number of methods for cleaning ballast have been considered, even to a gigantic vacuum cleaner which, on account of cost, is out of the reach of most of us. The most practical is the ballast screen. The standard performance with 3 screens and 12 men and a foreman is 200 ft. of double track per 10-hour day. To clean with forks, this length of track would take the same number of men 2.8 days or 36 men with forks to do the work of 13 men with the screens.

Much labor is applied each year to the cleaning of grass and weeds from the track and roadbed. Two



A LIGHT RAIL UNLOADER

methods have been more or less effective as "weed killers," burning, and spraying with a solution of arsenite of soda.

About ten years ago a western railroad designed a weed-burning machine. A strip seven feet on each side of center line of track was burned at an average cost of $9.46 per mile. Two burnings were necessary, so that to destroy the weeds the cost would be $18.92. As compared with hand labor it was claimed to save 14 men per day.

The spraying method has been extensively used. In 1916 the cost of spraying 744 miles of single track averaged $18.11 per mile. Including the train crew the work was done by 10 men, averaging 21 miles per day. To do a like day's work by hand where the growth was medium heavy in soft ballast 273 men would be required at an average cost of $23.25 per mile. A large saving in men is thus effected, though not so much in money.

The battered and worn ends of otherwise very good

relaying rail make the maintenance of the rail when relaid difficult, resulting either in poor track or a large expenditure of labor to keep it up. This labor expenditure can be reduced to normal if the smooth ends and the full section under the head, insuring a good angle-bar fit, are restored. This can be done very well by sawing off and redrilling the ends. Machinery for this purpose is to be had, consisting of a steam power plant, high speed cold friction saw and drill presses mounted on a flat car for ready transportation. With a full supply of rail on hand from 300 to 350 rails can readily be sawed and drilled per day. Most excellent results are obtained from rail treated in this manner, which, when laid with new angle-bars and well matched as to height, rides about as smoothly as new rail.

One of the most widely exploited of the labor-saving devices is the section motor car. It undoubtedly makes possible a reduction in the number of men required to maintain a section of track, and the longer the section and the larger the gang the greater is the saving, by reducing the time going between headquarters and the work. The motor car also greatly increases the range of activity of floating and extra gangs and avoids the use of work and regular trains for transporting the men, with the attendant delays and frequent overtime allowance. The use of the smaller inspection cars by supervisors, master carpenters, signal maintainers, enable them to give more frequent and more detailed inspection and supervision to their work with attendant economies and labor savings.

No discussion of labor-saving devices would be complete without mention of devices for cleaning away snow and ice. The broom and the shovel are effective, but are required in large numbers with a man to each one. On the line snow plows of the various types and snow flangers take the place of multitudes of men in their accomplishments. Around interlocking plants and switches and in terminals certain thawing devices are effective. In an emergency a yard engine equipped with a sufficient length of steam hose, using live steam from its boiler, will thaw out switches with great rapidity which otherwise would require a large number of men.

Steam pipe and gas jets are sometimes used under important switches in busy terminals. It would be difficult to estimate the savings in labor made by the use of snow-cleaning devices as the work is generally done under abnormal conditions, making the keeping of reliable cost data impossible. It is apparent that these savings are considerable.

The foregoing descriptions are of those devices and methods the use of which makes for big savings in men. There are also many devices of more or less worth, but of minor importance as labor-savers. However, if each one is used to within the limit of its possibilities, the aggregate will be worth while. Some of these are mentioned below:

Track dolly (running on one rail, for trucking a tie or two at a time, a keg of spikes, and, by use of a box attachment, small quantities of ballast, etc.); tool grinder; tie spacer; machine for driving down screw spikes and lag screws; rail layer (a small portable hand crane for laying rails in position in track, taking the place of tong men); rapid nut tightener for track bolts; rail benders; switch point straightener; an attachment to a motor car to mow grass and weeds for a limited distance each side of the track; portable tie and timber dapper; rail joint expander (saving the labor of driving back the rail); milling machine for milling a pocket in the stock rail of switches to protect the point from wear and reduce renewal costs.

It may seem that the field has already been well covered and that the possibilities are about exhausted. Perhaps this is so, and that we can expect no great supermachine will be developed that will at once take the place of the men we lack and relieve us of our maintenance troubles. We can, however, use to the utmost, and with good judgment, the resources which we now have at our command. By pulling in the slack the lost motion will be taken up. This can be done by standardizing, after careful study, the methods of doing the various items of maintenance work, the gang organization and equipment required to carry out those methods, and the measure of the day's work. The performance measured by the standard will tell whether labor is being wasted or saved. The work should be well done in as permanent a manner and form as possible, for, after all, permanency is the great labor saver.

EXTENSIVE PRIORITY REVISIONS

THE PRIORITIES DIVISION of the War Industries Board announces the formal cancellation of all outstanding priority ratings, whether by certificate or automatic rating, excepting those for the navy, the Emergency Fleet Corporation, railroads, telegraph and telephone companies. This action is taken in Circular No. 56, dated November 20, and supersedes Circular No. 4, dated July 1, 1918. The new circular is abstracted below:

Section I. Effective as of November 22, 1918, all priority certificates and all automatic priority ratings heretofore issued are hereby revoked, save such as have been issued covering:

(a) Orders placed by the United States Navy Department,

(b) Orders placed by the United States Shipping Board Emergency Fleet Corporation, and

(c) Orders placed by railroads, telegraph companies and telephone companies.

Section II. Emphasis is here given to the fact that priority directions and requests, whatever their form, have been entirely disconnected from the placing of orders; their sole purpose and function being to define the relative importance of orders when placed. The provisions of Section I hereof, revoking the existing priority directions therein mentioned, do not in any wise operate as a cancellation of the order itself, or otherwise affect the order save to cancel the priority rating thereon as of November 22, 1918. The full force and effect of the directions prior to that date are retained and preserved for the benefit and protection of all who have respected and observed them.

Section III. Effective November 22, 1918, all rules and regulations heretofore promulgated by the Priorities Division providing for automatic priority ratings are hereby revoked and cancelled.

Section IV. While applications for the issuance of priority certificates may still be made to the Priorities Committee on application form P. C. 15, such applications should be made only where the need is urgent and where it is clearly in the public interest. With the lessening demands for materials to be used for war purposes, the need for priority assistance will constantly grow less. It is, however, in the public interest that the filling of orders for the Navy Department of the United States, the United States Shipping Board Emergency Fleet Corporation, railroads, telegraph companies, and telephone companies, and orders hereafter placed by the War Department of the United States, be expedited as much as possible, and that all possible assistance be rendered toward stimulating the construction of railroad locomotives and the manufacture of other railroad materials, equipment and supplies, etc.

Section V. Preference List No. 2 (Circular No. 20) and all supplements and amendments thereto issued by the Priorities Division of the War Industries Board for the guidance of all Governmental agencies and others interested in the production and supply of fuel and electric energy; the supply of labor; and the supply of transportation service by rail, water, pipe lines or otherwise, is hereby, effective November 22, 1918, revoked and cancelled. The Priorities Division will from time to time promulgate such rulings and make such suggestions and requests in connection with priorities in the production and supply of fuel, electric energy, labor and transportation, as changing conditions may require.

THE RECLAMATION OF USED RAILS

The Impetus Given to This Work Under War Conditions Will Be of Permanent Benefit

IN LAST MONTH'S ISSUE attention was directed to the necessity for practicing rigid conservation through the re-use of rails released from track and a series of descriptions was presented to show what various railroads were accomplishing by sawing off the battered ends of old rails, thereby eliminating, in many cases, the one objectionable feature which had led to the removal of those rails from track. Similar practices on four other roads are explained in detail on this and following pages and an exposition is also given of a somewhat more complete method of restoring the life of rails—the process of rerolling them to a slightly smaller section.

In the previous installments of this series of articles special stress was placed on the absolute need of saving every pound of steel as a war measure because of the urgent demands on this metal for actual war purposes. However, reclaiming rails cannot be said to be solely a war measure since extensive activities along this line by certain of the roads for many years past has demonstrated that it is a matter of sound business under peace conditions. Therefore, while the war had served to extend the scope of interest in this subject, the recent signing of the armistice is no argument for discontinuing the work. Moreover, prices of new material are still on a war basis, and if the reclaiming processes could be conducted with economy during times of normal prices, surely the charges that can now be placed against all material renewed should justify the operations.

Results of Rail Sawing on the B. & O.

In order to obtain the full life of rails the Baltimore & Ohio has operated a rail sawing and drilling machine for the past five years. With this machine rails removed from main tracks because of the damaged condition of the ends are made fit for further use in main line tracks and it has been found that rails thus reclaimed are notably free from failure, owing to the fact that, having been previously subjected to traffic, all inherent defects have developed and the defective rail removed from the track, leaving only perfect rail to be sawed.

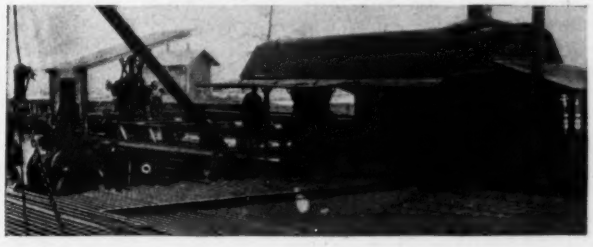
RESAWED RAIL IN TRACK

The machine used on this road was purchased from the Industrial Works, Bay City, Mich. It is portable and is mounted on a flat car 61 ft. long by 10 ft. 4 in. wide. It comprises an upright boiler 53 in. by 120 in.; one double engine with 12-in. by 14-in. cylinders designed to make 200 revolutions per minute; one 42-in. high speed cold friction saw with an automatic feed attachment for sawing, and two gang drilling machines of three spindles, each located about 35 ft. apart center to center. While this machine is portable, the cost of setting up (approximately $1,000) precludes frequent moves, it being cheaper to haul the rails from considerable distances than to move the outfit. In its five years in service on the Baltimore & Ohio the machine has been moved twice, the installations being at Lodi, O., on the main line between Pittsburgh and Chicago; at Martinsburg, W. Va., the site of the principal reclamation plant on this line, and at De Forest Junction, O. In the main the installations were similar and in all cases it was necessary, in order to carry on the work economically, to erect platforms and derricks, to provide for coal and water supply, fit up office and bunk buildings and provide for side track facilities.

The force required in the operation of the saw and drills consists of the foreman, timekeeper, engineman, fireman and one operator at the saw, four men at the drills, one hoist man, 16 to 20 laborers, a watchman and a cook. With an experienced force the cost of sawing closely approximates $170 per mile of track.

The rail reclaimed is that released from lines of light curvature where renewals are made because of the damaged condition of the rail ends. Such rail is shipped to the plant in open equipment, usually gondolas, and is unloaded by derricks on to platforms located conveniently to the saw. From the platform the rail is moved to the saw by hand, using rails for skids. At the saw it is raised to the sawing table by an air hoist at one end and a hand derrick at the other. One end of the rail is then sawed and the rail moved ahead on the table by means of steel rollers to the proper position for making the second cut. The drilling is the next operation, after which the rail is loaded into cars on the far side of the plant, ready for shipment.

In loading the rail for shipment to the saw, no effort is made by means of markings to make a record of the sequence of rails in track. Instead, a fit when the rail is relaid, is insured by calipering all rail to be sawed to determine the wear on the head. The greatest variation allowable from the full section is 1/32 in.



THE SAW AND SAWING TABLE

As evidence of the possibilities of such a plant the results of three months' operation are pertinent. In this period a total of 219,497 lin. ft. of 85-lb. rail, or 2,710 tons, was sawed with the force outlined above. Of this total, 99,966 ft. was sawed from 33-ft. lengths and 119,531 ft. from 60-ft. lengths. This was done at an average cost of $1.29 per ton of rail and $167.82 per mile of track. In producing the 2,710 tons of sawed rail there were left 199.76 tons of scrap ends. Including the depreciation of the plant and the interest on its first cost,

the cost of operation, allowing $22 as the value per ton of relaying rail, and making a deduction for the scrap value of the ends, the total cost of rails fit for main line use was $23.44. This figure is misleading to the extent that the cost would have been less had the operation of the plant been continuous over the period of 12 months which was the basis for the calculations of depreciation and interest, while, as a matter of fact, the plant was operated but three months.

Inspection of the rail after it has been in track several months subjected to a heavy low speed traffic disclosed the surface of the track at the joints to be good and in no instance has it been found that the rail was being battered at the joints because of one rail being higher than the other. Several of the rails were twisted either from improper handling or from a permanent set under traffic. This, however, has not seriously affected the rail. The inspection further disclosed that there had been no failures in the rail to the date of the inspection, and it is reasonable to expect that there will be few failures in such rail, as the defective rails would have evidenced themselves by failure under traffic in the track from which the sawed rails were released.

One of the photographs illustrates the appearance of the sawed rail relaid in main track. In laying the rail both new and repaired joints were used, care being taken to insure that the repaired joints were straight and of full section.

Rail Sawing on the Chicago & North Western

The Chicago & North Western has three plants for resawing rails released from track: one at New Butler, Wis., which serves all lines east of the Mississippi river; another at Boone, Iowa, for the lines west of the Mississippi except those in Minnesota and South Dakota, and a plant at Huron, S. Dak., serving the lines in Minnesota and South Dakota. The plant at Huron is equipped with one of the earlier types of saws, belt driven from a steam engine, and is engaged for the most part in resawing the lighter weights of rails released from the secondary lines predominating in the territory tributary to it. The plants at Boone and New Butler are of modern design, practically duplicate in construction. The one at New Butler, being the newer of the two, is described in detail here.

The resawing of rail is practiced extensively on the North Western under the direct supervision of the assistant general manager, the disposition of all rails released from track being determined by him personally. The economies derived from this practice are not limited to the improved riding qualities of the resawed rail as relaid, since further savings have been accomplished through the salvage of rails containing defects, the defective portions being sawed off and the remaining parts returned to service. As an illustration of this: 12½ miles of rail which had been released from the main track after having developed an unusually large number of half-moon base fractures had been tentatively assigned to scrap or side track use. After a re-examination of this rail it was concluded to have the defective portions sawed off where practicable, with the result that 60 per cent of the tonnage has been returned to service in main tracks in lines subjected to heavy but slow traffic.

The New Butler rail sawing plant is located at the New Butler engine terminal on the North Western belt railway around the city of Milwaukee and handles about 335 rails daily during a working season of about eight months. The rails sawed are of any weight from 60 lb. and 100 lb., with the heavier sections predominating.

The plant occupies a building 40 ft. by 50 ft. in area, built especially for the purpose, with skids outside adequate to receive rails in four tiers, with one set of skids for shipping the resawed rails. The layout is simple and direct. The saw is located in the corner of the house closest to the receiving skids and receives rails from any of the four banks of rails on a set of rollers extending the entire length of the skid. The first end of the rail is sawed off as the rail is brought up to the saw and the second end as the rail is passed on into the building. After the second cut is made the rail is shifted transversely across the house to the opposite side where the drill presses are located, one in each corner of the building. These presses are out of line transversely just enough so that one press works on one rail while the other is at

THE SAW RESAWED RAILS UNLOADING RAILS ONTO THE SKIDS

work on another. After the bolt holes have been drilled the rail passes out of the house through a door at the corner diagonally opposite the one from which it entered and is placed on the loading skids ready to be shipped out.

All rails are received on the skids closest to the building, where they are inspected and marked for cutting. About one foot is sawed off each end of the rail, but the cuts are so made that the remaining length is in even feet. If the ends are broken or any other defects are found a sufficient length of rail is cut off to eliminate them, always keeping the length of the sawed rail in even feet. The only limit placed on this is that the rail shall not be classed as "main track" if it is less than 22 ft. long. However, if the defect consists of a half-moon break in the base less than 15 in. long, instead of sawing it out, a pair of angle bars is applied over the break and the rail is returned to service in slow speed freight lines as if no defect was present. Where more serious defects than this occur more than six feet from the end of the rail, the defect is cut out and the remaining portions of the rail are coupled up with angle bars and shipped out as one rail, for side track use.

The rail is supposed to be classified as between main and side track by the roadmaster or other person who ships it in, but the inspection made on these skids permits any reclassification found desirable, so that any rail found to belong to some other class is rolled back to another set of skids instead of passing through the saw building. The rails on the other skids are run through the plant at some time when a sufficient number have accumulated or when there is a call for them.

The saw plant foreman receives invoices of all rails shipped to the plant and is also sent transfer orders from the assistant general manager which indicate where all rails received for resawing are to be shipped. The foreman makes a report each evening showing the amount of rail resawed and the transfer orders on which it applies. The rail received on the unloading skids generally passes directly through the plant and out onto the loading skids.

The resawing is done by a No. 3 electrically-driven Ryerson friction saw having a 52-in. by 5/16-in. blade. About four of these saw blades are required for a season's work, but the saws are changed at intervals of about 400 cuts for the purpose of redressing the edge which becomes somewhat rough and accumulates a deposit of metal on each face close to the edge. The work of redressing is done on a lathe and requires only five or ten minutes' time and, being done by the foreman, involves no direct charge against the work. The drills are equipped to drill two holes at once and use high speed steel bits that will drill 15,000 holes each without lubricant before they require renewal.

The force at the plant consists of a foreman and 14 men. Two men bring the rails from the skids to the saw and hold the rail while the first cut is made, one man operates the saw and two men handle the rail for the second cut of the saw and skid it to the drill presses. One man operates each drill press and three men take the rails away from the drills, chip off the burrs at the sawed ends and take it out onto the loading skids. Four other men are occupied in unloading the rails from cars and in reloading and in inspecting and measuring rails for sawing. The cost of the work, based on the rates of pay now in effect, is $0.60 per ton, including all operations from the time the rail is unloaded until it is again loaded and including all charges for supervision, but not interest or depreciation on the investment. Attempts to operate the plant during extreme cold winter weather have proved unsuccessful because of the freezing of water on the saw blade.

Reclaiming Methods on the Rock Island

The Chicago, Rock Island & Pacific is another road which has given considerable attention to rail reclamation. It operates a portable rail sawing plant, which is moved from division to division as rail is released which can be reused if the battered ends are removed. While on each division, this saw is operated under the direction of the division engineer, although the crew operating the saw accompanies it from place to place.

As rail is taken out of track it is inspected by the division engineer or more commonly by the roadmaster, and is classified into (1) that good for main line use by resawing; (2) that suitable for use in main lines if rerolled; (3) that fit only for yard and side tracks, and (4) scrap. If any considerable quantity is to be resawed and the sawing outfit is sent to the division on which it is being released and it is sawed there for shipment for other lines. Thus during the past summer the saw has been stationed at Silvis, Ill., where 40 track miles of rail released from the Illinois division has been sawed before shipment to the Dakota division. When this work is completed the outfit will be transferred to the Amarillo division, where a similar mileage will be sawed this winter. Only rail of 80 and 85-lb. section is now being sawed. One foot is removed from each end. In general, only 33-ft. rails are sawed, no provision being made for the reclamation of shorter rails at this plant.

This mill is operated in accordance with a definite program for rail replacements common on many roads, whereby rail released on important main lines is transferred to less important or branch lines and then into side or yard tracks. All rail which has been sawed is fitted with new angle bars, the angle bars released being used in side tracks or scrapped.

All rail classified as scrap out on the line is sent to the system reclamation plant at Silvis, Ill., where it is sorted and reclaimed or sold. The tonnage handled at this point during the past year has been considerably above normal, owing to the taking up of the rail on many abandoned tracks. All rail weighing under 60 lb. is sold, while all heavier than this and fit for further use in whole or in part is held for use in minor branch lines or side tracks. As an indication of the extent of this salvage, approximately 25,000 lin. ft. of rail is now held at Silvis which has been recovered in this manner.

Practically all materials coming to the reclamation plant at Silvis are handled with traveling overhead cranes with magnets. As the rail is received it is sorted with such a crane and a small magnet which handles one rail at a time. In this way it is also possible to secure a good inspection of it. Two men and a magnet are able to handle all the scrap rail and track materials for the system as well as the switches, bolts, spikes and other track fastenings carried in stock at this point. The tonnage of rails alone which were handled here in 1917 aggregated 39,540 tons.

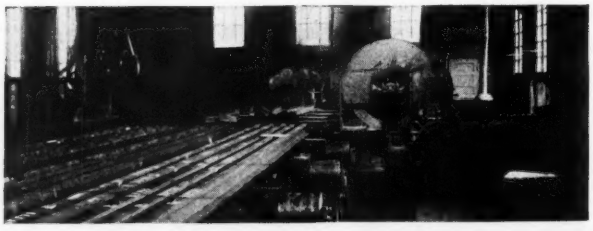
The principal salvage secured from rail at Silvis other than rail returned to service as outlined above is in material suitable for conversion into guard rails. Until about three months ago all guard rails of other than 90-lb. and 100-lb. sections were made in this way, but a

shortage of labor has interfered with these operations somewhat. The rails are all recovered from what was classed as scrap by the field men and would otherwise be sold as such. They are cut to the proper lengths with the saw or more commonly with an oxy-acetylene torch. The rails are bent to the proper angle in a bulldozer in the reclamation shop. In 1917, 1,234 guard rails of 85-lb. section and lighter were made in this way at an estimated cost of $7.18 as compared with a quoted price new of $13.93, saving $6.75 per guard rail.

The reclamation plant at Silvis is operated by the storekeeping department, while all inspection, classification and saving of other than scrap rail is done by the engineering department.

The Chicago Great Western Plant

Although a road of only 1,500 miles, almost all of which is single track, the Chicago Great Western has operated a rail reclamation plant at Oelwein, Ia., for the last three years. The amount of rail to be handled is not sufficient to enable the plant to operate continuously even during the summer months, but in spite of the increased cost of operation which this produces, a large saving is effected through the improvement in the rails which is secured. As it is, the mill is operated about half the time on rails and frog and crossing work combined.



INTERIOR OF THE SAW MILL

The principal unit of equipment for the reclamation of rail consists of a 52-in. Ryerson friction saw which removes one foot (or more if necessary to eliminate defects) from each end of the rails of standard length. They are then taken to a drill press and the holes drilled in one end, after which they are moved back on skids to a second drill press, where the operation is repeated. The rails are sorted and graded according to weight and conditions before they are placed on the skids to await shipment.

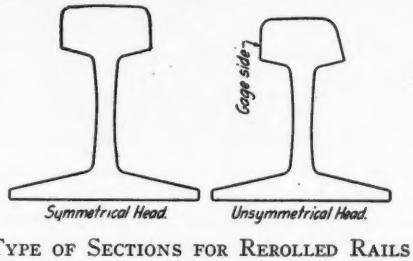
An 85-lb. rail can be sawed in 30 sec., while it required about 40 sec. to drill the holes in one end. Working under the conditions under which this mill is operated approximately 350 gross tons of rails have been reclaimed in this plant in a month, in addition to the necessary cutting and drilling of rails for frog and switch work. The cropping and drilling of rails is done at a cost of approximately $1 per ton, exclusive of the cost of loading and unloading the rails in the yard.

After passing through this mill the rail is returned to main line service in the same line with new rail of equal section. It is sawed to lengths down to 20 ft. for main line use, while shorter lengths are employed in the construction of frogs and crossings. Auxiliary to the rail reclamation plant is a frog and crossing shop in which repairs are made, but where no new frogs or crossings are made except in special cases. This plant is operated as part of the general reclamation plant and is under the supervision of the general storekeeper.

Restoring Rails by Rerolling Them

Another method of securing increased service and improved riding qualities from rails is by rerolling them to a smaller section. This process was conceived 27 years ago by E. W. McKenna, a railroad man of long experience, who was until recently vice-president of the Chicago, Milwaukee & St. Paul. This process was put into practice experimentally in 1895 and commercially in 1898, after the completion of a plant at Joliet, Ill., built by a corporation organized to carry on this work and which is now known as the American McKenna Process Company. Other plants have since been built at Kansas City, Kan., and at Tremley Point, N. J., and considerable tonnages of old rails have been rerolled each season for the last 20 years.

The fundamental operations by which the rerolling is accomplished have not been changed appreciably during this time. However, experience with rerolled rails in service during this extended period has brought to light certain difficulties and has given opportunity for the correction of the particular phases of the operation responsible for them. As a consequence there has been developed a technology or trade skill in the rerolling of rails whereby it is enabled to secure a perfection and uniformity of results not possible with the same working equipment 15 or 20 years ago. At the same time, improvements in the process of rolling new rails as well as the reduction in the total number of different rail sections used by the various roads have greatly decreased the problems confronting the reroller. For instance, one difficulty formerly encountered in rerolling rails was a marked variation in the flange thickness of rails supplied on orders for a single section, but the introduction of the continuous joint and other splices of the flange-gripping type compelled the rail manufacturers to finish rails to a much greater uniformity and thus this difficulty has been eliminated very largely from the standpoint of the rerolling process.



TYPE OF SECTIONS FOR REROLLED RAILS

Briefly, the process consists in heating the rails to a moderate red heat and then passing them through two sets of rolls which have the effect of reshaping the section in such a way as to produce a head of uniform shape, to restore the fishing surfaces of the head and flange so as to take the original splice bars, and to give the base a width that will permit the use of standard tie plates. This has the effect of reducing the weight per yard about 8 or 9 lb. and of elongating the rail so that the finished

length after the ends have been cropped is 34 ft. instead of 33 ft. Subsequent to rolling the various stages in the process such as cambering, cooling, straightening, drilling, chipping burrs, etc., conform in general to the standard practices in rolling new rails.

The two most important stages in the process are the heating and the rolling, and the procedure to be followed in each of the other phases of the treatment may be said to have its determination primarily in the various practices developed in these two major features of the work. The heating of a piece of metal 33 ft. long to a like degree throughout its entire length requires a furnace of special design. The furnaces have a capacity of 18 100-lb. rails set side by side in a work-wise position, they being placed in the furnace through the agency of a charging machine capable of inserting 6 rails at a time. The rails are removed one at a time from the opposite end of the furnace by means of a hook inserted in one of the bolt holes, this hook being fastened to a rope that winds on a drum. Each rail in turn is shifted broadside on a transfer table to the feed table of the leading rolls, passing through these rolls and the finishing rolls in succession. The process is much like that of the last two passes in the rolling of new rails, although several important improvements have been introduced since the rerolling of rails was originated. These improvements may be classed under two heads, methods of rolling and proportions of the finished rail section.

ABOVE—INSPECTING THE FINISHED RAIL.
CENTER—INTERIOR OF THE MILL—FURNACE AT THE RIGHT, ROUGHING ROLLS AT LEFT, FINISHING ROLLS IN THE BACKGROUND.
BELOW—RAILS ON THE HOT BEDS—THEY HAVE JUST BEEN TURNED OVER AFTER PASSING THE RECALESCENCE POINT.

In rerolling, one change has been in the roughing rolls, which are now of such shape that the rail passes through them with the base on an angle with the vertical equal to half of the fishing angle. In other words, with a rail having a fishing angle of 13 deg., both the bottom and the top surfaces of the lower flange have an angle of 6½ deg. with the vertical. As a result of this arrangement the rolls can be given such a form that they come in direct bearing on all four sides of the rail head.

One of the most vital improvements in the process from the standpoint of the user has been in the determination of a form of section for the head as rerolled, which is most suitable to the rerolling of rails having various degrees of wear. In the earlier work with this process, it was assumed that a symmetrical shape was paramount and therefore if the rail was appreciably worn it was necessary that either the height and width of the head or both be reduced a sufficient amount to produce a symmetrical head with whatever material was left. Moreover, in the case of rails having one side of the head badly curve worn it was necessary to push over the material from the unworn side of the head to fill out the worn side, a process which was not conducive of the best results.

After considerable study it was concluded that the prime requisites in the shape of the head were a fixed depth; that is, a fixed distance from the fishing surface to the tread, together with a correct shape for the gage side of the head, while the width of the tread and the angle of the outer side of the head were of minor importance. As a result the usual practice at present is to give a symmetrical head only to those rails having a relatively symmetrical head, as worn. On the other hand, all the rails that have been unsymmetrically worn are rerolled in a manner that gives the same form to the inside face of the head and the same height as in the less worn rails, but with the outer side of the head inclined inward to compensate for the loss of metal. In this case the old inside or worn face of the head becomes the outside face of the rerolled rail. To this end all rails received are carefully inspected and classified as A, B and C, "A" rails being those to receive a symmetrical section, while B and C rails are given unsymmetrical sections as indicated in the drawing.

These primary classes are based on the rails from a single road or a single section of a road which are re-

leased from track with practically a uniform amount of metal loss through wear on tangent tracks. If rails of the same section are received in which the wear is much greater, it may be necessary to design a new A section (with corresponding new B and C sections) having a smaller area in the head. This condition may be taken care of in part by the fact that the rolls wear somewhat during use, in a manner that tends to reduce the rail section as the time approaches for redressing the rolls, the average tonnage that may be rolled from a set of rolls before redressing being about 1,500 tons. This condition is taken into account by holding the more worn rails for rolling last and thereby makes it possible to produce a somewhat larger number of A rails from a given lot of rails received.

In general, the relative proportion of A, B and C rails to be obtained from any lot received will depend upon the relative amount of tangent and curve-worn rails and the degree of wear on all of them. Sometimes a consignment of rail will produce as much as 85 per cent of A rail with 10 per cent of B and 5 per cent of C rails. In other cases only 75 per cent of the lot will be A rails.

While the A, B and C rails may be laid in track indiscriminately without affecting the riding qualities of the track, the necessity for rolling the several classes separately serves automatically to separate them at the mill. Furthermore, each class is distinguished by a distinctive color painted on the ends, while in addition all of the B and C rails are given a streak of white paint on the side of the head, which must be the gage side in track. In consequence, there is no excuse for mixing up the classes in relaying them.

After rerolling, the ends of the rails are cut off to insure a full section of metal at the extreme end of the rail and to remove the portion of the rail containing the old bolt holes, although when there are three holes the last one is left, the cut being located so that this hole will be staggered a sufficient distance from the new splice holes. The process of rolling has a tendency to close up the old bolt holes somewhat and experience with rerolled rails in track indicates that the presence of the old holes has no detrimental effect.

Some years ago difficulty was encountered in the form of a badly cracked condition of the surface of the rails near the ends, particularly in the web, and a considerable amount of study and careful investigation was required before the cause of this trouble was discovered and elimonly with rails containing small pieces of copper bond inated. It was found that this phenomenon occurred wire, the presence of this copper in the rail during the heating and rolling process having the effect of making the steel hot short, that is, brittle at the temperature of rolling. This led to the practice of driving out any fragments of copper imbedded in the ends of the rail, which eliminated this difficulty.

After sawing, the rails are passed through the cambering rolls and are placed on the hot beds, being placed from two to three feet apart, as recommended by some rail experts to insure a more uniform temperature of the surrounding air during the cooling. The rails are turned over at the point of recalescence, this being determined by the point at which the rail has cooled so that the camber is entirely removed and it is beginning to bend in the opposite direction. The attendant naturally watches this closely, as the rails can be turned with the least effort just at the time that they are straight. One of the photographs shows the rails on the hot bed. The seven rails in the center and right have just been turned over after having straightened themselves momentarily as they passed the recalescence point. They have already taken the reverse curve, preparatory to reversing themselves again to about the original camber. The hot rails are allowed to lie as shown in the center, undisturbed and about 9 to 12 in. apart. After cooling 40 min. in this manner they are pulled up together, as shown on left. This hot bed has movable panels shown in the background, so that the building can be closed in cold or stormy weather.

Another refinement in the process of considerable importance, preliminary to heating and rolling is the removal of all fins or rolled edges, such as are formed on rails having soft heads, or inside rails on curves. This is accomplished by passing the rails by a set of carborundum wheels which grind off the rough edges in a manner that also tends to tear off or loosen any partially-detached pieces of metal which may have become cold-rolled into the tread surface. These pieces are then readily taken off by chipping.

No attempt has been made in this process to weld rails having split or cracked heads or piped webs, but there is nothing in the process which prevents the cutting off of defective parts of rails and the rerolling of the remaining portions, and some railroads have taken advantage of this feature. One particular advantage in the process is derived from the fact that many concealed defects are disclosed during the rerolling process. Moon-shaped fractures in the flanges that have not progressed far enough to cause complete separation will often break out in the rolls or in the straightening presses and thus permit the elimination of rails which might otherwise be placed in severe service.

The rails to be passed through a given set of rolls are necessarily of one section and of a single class and must be sorted carefully as such beforehand to produce good results. In general the rails should be received at the mill in lots of 1,500 tons of one class to justify the expense of setting up the rolls, but provision may frequently be made for the economical rolling of lesser amounts.

RULES FOR MEXICAN IMMIGRATION

THE SECRETARY OF LABOR of the United States Government has recently approved a memorandum prepared by the director general of the United States employment service and the commissioner general of immigration to govern the action of the Immigration Service and the Employment Service in the matter of admitting Mexican laborers into the United States. Rules in this memorandum which concern the employers of such labor have been abstracted below: Mexican laborers entering the United States in pursuance of the departmental orders will be regarded as falling into two classes, to wit: (a) Those destined to an employer who is responsible for their importation and entitled under the departmental orders to import and receive them; and (b) those who arrive at the ports and apply for admission without having the employment actually arranged or in sight.

Officers and employees of the Employment Service will, upon every occasion when they find a Mexican laborer admitted in pursuance of the departmental orders who refuses to engage regularly and continuously in one of the occupations permitted by the said orders, report the case to the nearest immigration officer so that deportation proceedings may be instituted.

The privilege of importing Mexican laborers under the departmental orders will not be extended to agents or agencies that operate on a fee basis, nor to employers who make use of the services of agents or agencies operating on such a basis; and the immigration and employment officials will co-operate to prevent this.

MAINTENANCE PAINTERS MEET AT CHICAGO

Problems of the Day in This Field Were Discussed at a Three Day Meeting in October

THE SEVENTEENTH annual convention of the Maintenance of Way Master Painters' Association of the United States and Canada was held at the Hotel La Salle, Chicago, on October 15, 16 and 17. The labor situation, the recent wage advances, conditions in the paint supply field, and the use of labor-saving devices were the principal subjects discussed at the meeting. Because of the epidemic of Spanish influenza, which was at its height at that time, the attendance was not as large as was expected, although 33 members out of the total membership of 73 were in attendance.

The officers of this association during the past year were: President, H. E. Conrad, master painter, Pennsylvania Railroad, Huntingdon, Pa.; first vice-president, H. F. Jones, master painter, Cleveland, Cincinnati, Chicago & St. Louis, Wabash, Ind.; second vice-president, Ole Stubstad, master painter, Chicago & North Western, Winona, Minn., and secretary-treasurer, F. W. Hager, master painter, Fort Worth & Denver, Fort Worth, Tex.

The first session was called to order on Tuesday morning, October 15, by President Conrad, with a total attendance of 41 members and friends of the association. A prayer was offered by Rev. Frank O. Beck of the Wabash Trinity Parish, Chicago, and an address of welcome was tendered by Harry B. Miller, prosecuting attorney, City of Chicago, in behalf of the city and the Chicago Association of Commerce. The president's address referred briefly to the opportunities which the association offered for the dissemination of practical knowledge on railroad bridge and building painting and urged those present to assist in increasing the membership. The secretary's report showed a membership of 73, a net increase over the preceding year of 16.

Following are abstracts from papers presented at this convention together with discussions of them.

PAINTING STATIONS

By G. W. Thompson

Chemist, National Lead Company, New York

There are such a large number of paint materials that it is impossible for very many persons to become fully equipped with the knowledge of their suitability for the various ends sought. The number of paint materials is increasing steadily with a corresponding increase either in confusion or in the need of more study on the part of the user unless there is provided some simpler way of handling the whole question. To illustrate—paint specifications for railroad stations have been complicated and bewildering and I would urge simplification of formulæ and simplification of color schemes. This lack of simplicity is due to a failure to appreciate some of the simpler principles of paint designing.

Take, for instance, the question of durability. As paint is made of vehicle and pigment, the question we should ask is to what extent is the durability of paint dependent upon the pigment or upon the vehicle or both? It is obvious that pigment alone will not protect. It is equally obvious that oil alone will not protect, and yet it is perfectly true that pigments do not decay appreciably and that paint decay is due to the destruction of the oil present. These facts are well known and are not subject to controversy. They have, however, led to two different conclusions. One is, that as it is the oil that decays, the more oil you have in a paint the longer it will last. The other is, that inasmuch as it is the oil that decays, durability is obtained by the protective action of the pigment. The difficulty lies in the fact that there is a popular demand for high gloss finishing paints. I think that this is a mistake. Very few paints having a high gloss, excepting enamel paints, will retain that gloss satisfactorily for more than a year. High gloss is generally obtained by an excess of oil, and I am confident that high gloss paints, generally speaking, are less durable than paints which may be described as having a semi-gloss.

In the perishing of paint, the first thing that occurs is usually a loss of gloss. Experience has shown that a high gloss paint at the end of one year will have, as a rule, very much less gloss than a paint which had a semi-gloss at the beginning. This is one of the fundamental things which should be considered in designing paints.

What I have said about substantial differences in paints applies equally well when we consider the questions of color and color schemes. Compare the two paints and you see a difference. Is the difference a trivial one or is it a substantial one? Placed side by side, the difference appears to be great. Separate the two paints, however, a short distance from each other and you may not be able to see the difference. Apply those two paints to two different buildings and they may give equally satisfactory results in so far as the color effect is concerned. In judging of color there ought to be some means of comparing them that will allow for considerable difference so long as those differences do not substantially affect their practical use. For example—a railroad used a certain dark olive and called for a paint composed of lamp black, prussian blue, chrome green and chrome yellow, a rather expensive paint. A paint could be made substantially equal to this by using lamp black, prussian blue, and yellow ochre, a very much cheaper paint and one, in my opinion, having equal durability.

All paints intended for decoration should be those that have no jarring effect upon the eye. All paints when applied, to get the best artistic results, should be those that blend in harmony with all other colors which may come to the eye from the same general source. Colors that contrast too sharply are not harmonious. This is why a pure white is not considered a good decorating color by the best artistic decorators. If we have a red in juxtaposition with a white, the white should be slightly on the red or an inartistic result is obtained. The same is true with regard to all colors. Pure white should never be used except for line effects.

REPORT ON THE VOLUME OF MAINTENANCE OF WAY PAINTING

At the last convention of this association a committee was appointed to obtain some measure of the volume of maintenance of way painting and it was concluded that this could best be obtained from data on the amount of material and labor expended in doing the work under the direction of the maintenance of way master painters. Accordingly, a questionnaire was sent to each member of this association requesting his co-operation in sending in an itemized statement of the amount of material used

under his direction during 1917 and the amount of labor in terms of total hours work and total pay roll for the year. Twenty-three replies were received which are fairly representative of the entire country since they include districts from Texas to New England and from Kentucky to Ontario. The total mileage covered by these reports is 12,690 or approximately 5 per cent of the total mileage of main line for all railways in the United States. The amount of territory covered by the individual master painters varied from 100 miles of line to 2,577.

With this information at hand, a table was prepared in which the amounts of white lead, lamp black, putty, linseed oil, etc., reported by each district was entered and by totaling these figures and dividing by 12,690, quantities were obtained which represented the average amount of material used per mile of railway line. Then taking the round figure of 260,000 for the total mileage of railway lines in the United States, figures were obtained which represent approximately the amount of material of each kind used by the railroads of the United States in the maintenance of bridges and buildings. The table below gives the totals obtained:

White lead	3,400,000	lb.
Red lead	2,100,000	"
Lamp black	190,000	"
All other pigments	360,000	"
Fillers	22,000	"
Whiting	58,000	"
Putty	570,000	"
Glue	11,000	"
Mixed paint for bridges	630,000	gal.
Mixed paint for stations	490,000	"
Linseed oil	480,000	"
Turpentine	130,000	"
Other thinners	56,000	"
Other oils	120,000	"
Varnishes	33,000	"
Shellac	14,000	"
Alcohols	6,700	"
Brushes	140,000	"

A similar analysis made with respect to the labor showed that the average hours of labor per mile of line during 1917 was 82 at a cost of $27. The total for the country on this basis was 22,000,000 hr. of work, or a total pay roll of $7,400,000. Approximate unit prices for the various materials applied by the committee placed the approximate value of all materials used by the maintenance master painters in the United States at about $3,500,000, which means that the total expenditure for maintenance painting aggregates close to $11,000,000.

There is a wide variation in the amount of material used per 100 miles of line on the different territories in question. The amounts of white lead used varied widely. One district reported none at all, a great many used as much as 1,200 lb. and three used over 9,000 lb. With bridge paint the consumption per 100 miles varied from practically nothing to over 1,200 gal.; with station paint the maximum was 1,800 gal. In the case of linseed oil, the minimum was 30 gal. and the maximum 1,460 gal. The amounts of oil or paint consumed cannot be used readily for comparing the work done on the various roads because of the lack of uniformity in the use of paints.

The annual pay roll offers a more definite idea of the amount of painting, since the labor charge represents a pretty fair measure of the amount of work done. The lowest expenditure per 100 miles of line was $450, the next lowest $750, most of them were in excess of $1,000, while the four largest in turn totaled $9,950, $10,100, $11,750 and $27,197. The last is not representative, as it includes the painting work done in one of the largest railway terminals in the country.

W. S. Lacher, managing editor, *Railway Maintenance Engineer*, Chicago, chairman.

THE PAINT SITUATION TODAY

By W. R. Parker
John Lucas & Co., Inc., Chicago

The paint industry, along with others, has felt the effect of the war in many ways, and considerable remodeling has been necessary to meet the situation, as it changes from day to day. A general idea of conditions as they now exist in the industry as compared to former conditions is given in the table below, showing the per cent of increased cost of certain representative materials based on June, 1918, figures as compared with the costs in effect in January, 1917, or practically a comparison covering 18 months.

Varnish gums—from 10 to 75 per cent increase.
Shellac, TN—180 per cent increase.
Standard zinc oxide—5 per cent increase.
Lehigh zinc—9 per cent increase.
Lithophone—25 per cent increase.
Silica—40 per cent increase.
One grade American ochre—170 per cent increase.
Another grade American ochre—90 per cent increase.
American sienna—60 per cent increase.
American umber—80 per cent increase.
Metallic brown (45 per cent)—130 per cent increase.
Imported French ochre—200 per cent increase.
Italian sienna—50 per cent increase.
Turkey umber—60 per cent increase.
Yellow prussiate of soda—150 per cent increase.
China wood oil—135 per cent increase.
Linseed oil—75 per cent increase.
Indian red—70 per cent increase.
Grinders' lamp black—40 to 50 per cent increase.

White lead has advanced only slightly during that period and French process zinc was on a lower price level than in 1917, and those two items are not included. The dry color situation has become the most serious, particularly as applied to chrome yellows and chrome greens. Dry color chrome yellow and green manufacturers have been advised that because of the shortage in ocean tonnage necessary to bring chrome ore to this country and the importance of using such chrome as does come in for ferro-steel, the use of chrome in the paint business will have to be very much curtailed if not entirely eliminated. To indicate what this would mean, an analysis of a 32 shade mixed paint color card now in general use shows 22 of the 32 shades contain chrome yellow and green in some percentage. Should this curtailment become necessary, it will undoubtedly become necessary to eliminate some colors and adopt others in their stead which do not require chrome yellow or chrome green in their makeup.

A great deal can be accomplished by manufacturers if all paint users would give consideration to the thought of permitting manufacturers to furnish standard pieces of goods for particular purposes that they know from their own standpoint will do that particular work, but which will not be exactly in accordance with the specifications under which the paint has been purchased. If this can be accomplished, even to a small degree, it will help out in the long run by not obliging the manufacturer to make several thousand different kinds of goods, but will be in line with the suggestion of the Commercial Economy Board in cutting down the standards to a few hundred instead of the several thousand of which they now consist.

There is a responsibility on all of us to conserve transportation. If, instead of making a lot of small requisitions, it were possible to order your requirements ahead for some time, it will facilitate the getting of materials and save clerical labor all along the line, and clear the way for getting out additional material and increase the manufacturer's output.

CLEANING OF IRON WITH THE SAND BLAST AND THE USE OF THE SPRAYING MACHINE IN PAINTING

BY A. E. WILSON
Master Painter, New York, New Haven & Hartford, Hartford, Conn.

Cleaning is the most important part of bridge painting, but it is almost impossible to get the men to do it properly. They will start in good faith, but before the work is completed they will slight it wherever they can. Painting over scale or the fine rust under it is labor and material wasted, as corrosion will continue as long as there is any rust under the paint.

The only way to remove the rust is by the use of a sand blast. This method will remove all rust and dirt and leave the iron in a condition to paint that will stop further corrosion. The best outfit to use is a portable machine, which is light and easily transferred in work cars or set up on the job without blocking the main track or stopping trains. In using the sand blast care should be used not to hold the nozzle too close or too long on the same place, as it will wear away the iron.

The cost of cleaning by the sand blast varies according to the style of the bridge to be cleaned; it will average about $1 a ton, which is much cheaper than it can be done by hand, while it is cleaned with results that are impossible by any other method. The heavy scales of rust must be chipped off with hammers or air chissels, as the sand blast will remove them only by eating through and the men operating the nozzles are apt to go through too far and cut into the iron.

It is necessary to follow up the cleaning with a coat of good paint and no places that have been cleaned must be left without painting, as corrosion starts very quickly after the use of the sand blast. All surface that has been cleaned must be painted before leaving the work at night, or it will be found in the morning that the work has been wasted, as the unpainted iron will be covered with a fine rust.

I approve the spraying of paint on bridges only in places one cannot reach with a brush or swab, but in applying cold water paint or whitewash on the interior of buildings or in the painting of concrete buildings I think spraying on the material is the best and cheapest method, as concrete is so porous that it takes quite a little time to rub the paint into the pores. Unless one has reliable men they will skip over the outside of the surface and not fill it in, which will leave it very uneven when finished. A portable compressor and tank for this work will pay for themselves in one season if there are enough concrete buildings, or shops to paint or whitewash.

I would not recommend the spraying of stations or other station buildings. It is pockets and other places that are difficult to get at with a brush, such as an I-beam bridge where the I-beams are so close together that it is impossible to get a brush or swab between them, where the sand blast and spraying machine do work that makes them such valuable additions to painting equipment—particularly where there is much of this work to be done.

In using the spraying outfit the air pressure on the tank holding the material should not be more than necessary to raise the material and cause it to flow slowly from the nozzle held in a working position. The air pressure at the nozzle should be just sufficient to atomize the material. The nozzle is held about 6 to 10 in. from the surface of the work, and moved back and forth with smooth and even strokes. It is very simple to apply and anyone with a little practice can cover a large amount of surface in a day.

H. E. CONRAD
President

THE LABOR SITUATION

Robert H. Ford, principal assistant engineer, Chicago, Rock Island & Pacific, spoke on the labor situation, giving a chronological account of the various events of the past four years which have been instrumental in bringing about the present shortage of labor. Before the war there was a more or less sharp distinction between skilled and unskilled labor, the former, being much more stabilized because of its organization, had been instrumental in standardizing rates, working conditions, etc. However, the war has tended to disorganize the skilled labor more or less because of the large number of men from the unskilled classes being drawn into the skilled trades. Floating labor, a class which has no equivalent in any other country, is the result of American social conditions and easy transportation. It constitutes one of the most difficult phases of the labor problem in this country.

In the early part of this year the United States Employment Service attempted to assume control of the situation, but many difficulties arose which are not yet entirely cleared up. One of the causes of complications is the duplication of efforts, as the railways and the United States Shipping Board operate independent agencies to a certain extent, although recruiting men also through the Government labor bureaus.

The United States Employment Service is definitely opposed to the private labor agency of the type in which men are required to pay a fee for the privilege of going to work, particularly at a time when there are not enough men to be had to fill all the vacancies available. Another of the difficulties is the misuse of the railroads to transport labor. Hundreds of men are shipped out daily and in many cases only a very small number finally reach the work for which they were destined. Many men take advantage of this system to obtain transportation free of charge from one point to another, who have no intention whatever of going to work. This condition formerly applied only to the unskilled labor, but it is now true to a very large extent of skilled workmen also.

The great demand for labor and the rapid increase in wages has produced a pronounced feeling of unrest among the working class. Compensation is judged essentially by comparison with the compensation of others and an advance of one class immediately becomes an argument

for a corresponding advance in some other class of men.

With such conditions at present it is to be expected that a marked readjustment must take place after the war. The rates of pay to labor will, of course, be subject to marked reductions, but it is not to be expected tnat the rates will ever return to the low basis of the past. Another difficulty to be contended with in the solution of the labor problem is the fact that there are in America probably 100,000 men who do not work. This is the result of lax laws and the existence of charitable institutions which provide sustenance for these men at rates so low that they are enabled to support themselves by working only one or two days out of ten. The liquor evil, of course, exerts a profound influence in connection with this phase of the situation.

OTHER PROCEEDINGS

A paper on structural metal primers and finishing coats by G. G. Mowat of the Sherwin-Williams Company, Cleveland, Ohio, discussed the theories of metal corrosion. The problem of protecting the metal with paint and the behavior of the various common pigments was also covered at some length.

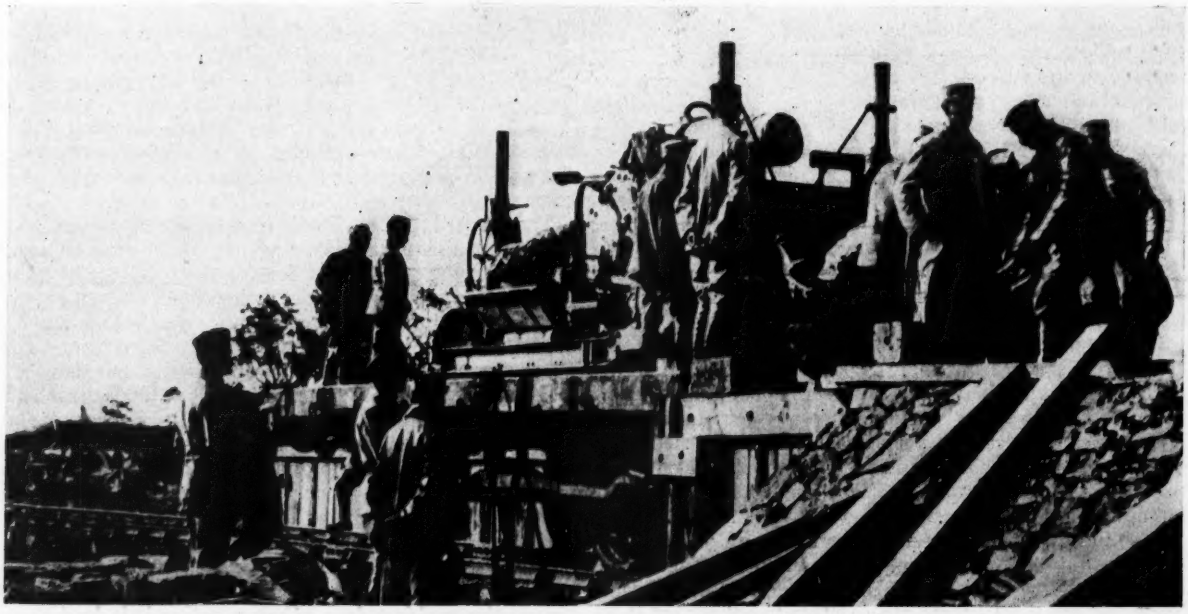
Carbolineum Wood Preservative was the subject of the paper by B. M. McDade, Detroit White Lead Works, Detroit, Mich. This constituted a general review of the decay of wood and an outline of the various wood preservative processes with a demonstration of the special place in this field occupied by preservatives applied by means of the brush.

A. B. Phelps, master painter, New York Central lines west of Buffalo, Cleveland, Ohio, led a discussion on the subject of painting concrete surfaces. The consensus of opinion from this was that the painting of such surfaces is readily accomplished if the concrete has been allowed to cure for a sufficient time to neutralize the alkalies that are destructive of paint. If the paint coating must be applied before this has taken place, it is necessary to apply one of several primers now on the market which are designed to neutralize the surface before applying the paint. Attention was called to the fact that it is necessary to have a good concrete surface to start with and that it is impossible for the painter to do a good piece of work on a surface that is inclined to scale off.

The most lively discussion ensued in treating the subject of the protecting of steel surfaces, particularly where subjected to corrosive gases or alternate wetting and drying as in the interior of a water tank. Several members recited their experiences with the failure of high grade metal paints when exposed to such conditions. H. E. Conrad (P. R. R.) told of the difficulties of protecting a coal dock on his road on which experiments were made with 35 or 40 different materials. He said it was necessary to patch the structure every year and to paint on an average of every three years. Experimental use had been made recently of a special preparation applied at a high temperature, but this has not been in service long enough to demonstrate its worth.

The painting of steel water tanks was also discussed as offering a severe problem in that the paint deteriorates rapidly where exposed to alternate wetting and drying, although remaining in good condition where kept covered by the water. One of the members explained in detail the manner in which a special protective material is applied in a thick coating at high temperature. Experience indicated that it would prove successful, but conditions surrounding the method of application are such that the men do not like to do the work. Several members reported on the use of coatings of crude oil to protect such surfaces as track scale levers.

All of the officers of the association were re-elected for the coming year and St. Louis, Mo., was selected as the place of the next meeting to be held on October 14, 15 and 16, 1919. On Wednesday afternoon there was no stated program and most of the members visited a demonstration of the coating of steel surfaces by the De Vilbiss spraying process as carried out in the repainting of the elevated railways in Chicago.



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FRENCH ARTILLERY UNIT SKIDDING A HEAVY GUN FROM A CAR TO A PLACEMENT

WM. G. MCADOO RESIGNS AS DIRECTOR-GENERAL

Ill Health and Financial Loss Lead Him to Desire Return to Private Life. This Action a Surprise

WILLIAM G. McADOO, director general of railroads, has resigned. He has also asked to be released from his cabinet office as secretary of the treasury. This action was made public by Mr. McAdoo at a conference with newspaper men on November 22. That it had been under consideration for some time was indicated in a letter to the president dated November 14, in which he asked that his resignation take effect as director generalship of railroads on January 1, 1919, or upon the appointment of his successor and as the secretaryship of the treasury on the appointment and qualification of his successor. In this letter Mr. McAdoo gives the following as his reasons:

"Now that an armistice has been signed and peace is assured, I feel at liberty to advise you of my desire to return, as soon as posible, to private life. I have been conscious for some time of the necessity for this step, but, of course, I could not consider it while the country was at war. For almost six years I have worked incessantly under the pressure of great responsibilities. Their exactions have drawn heavily on my strength.

"The inadequate compensation allowed by law to cabinet officers (as you know I receive no compensation as director general of railroads) and the very burdensome cost of living in Washington have so depleted by personal resources that I am obliged to reckon with the facts of the situation.

"I do not wish to convey the impression that there is any actual impairment of my health, because such is not the fact. As a result of long overwork I need a reasonable period of genuine rest to replenish my energy. But more than this, I must, for the sake of my family, get back to private life, to retrieve my personal fortune.

WILLIAM G. McADOO

"I cannot secure the required rest nor the opportunity to look after my long neglected private affairs unless I am relieved of my present responsibilities."

Mr. McAdoo has stated that he intends to take a three months' vacation in the open air, probably in the far west, after which he will return to New York and engage in the practice of law.

The President announced his decision to take over the railroads of the United States as a war measure in a proclamation issued on December 26, 1917. In this same proclamation he also announced his selection of W. G. McAdoo, then secretary of the treasury, as director general of railroads and fixed the time of the beginning of government control as December 28. Since that time Mr. McAdoo has been in responsible charge of the operation of the roads in addition to the arduous duties of secretary of the treasury, which included the financing of the war.

Under his administration a large central organization has been developed, supplemented by seven regional organizations. The corporate interests of the roads have been divorced from the operating organizations; many roads have been regrouped into new systems and other radical changes introduced. With the power and authority of the government behind him, Mr. McAdoo has been able to introduce many reforms which railroad men have long advocated, but have been prevented from putting into effect by restrictive legislation, the benefits of which it is to me hoped will continue to accrue to the roads after the termination of government control. At the same time, other steps have been taken which many men believe were not essential to the winning of the war nor to the ultimate interests of the roads under private ownership.

Although laboring under many handicaps inherent to government operation of a large transportation system, Mr. McAdoo has held the confidence of railway men and the public alike. While there have been some indications that the Railroad Administration was not averse to creating a sentiment favorable to the ultimate retention of the roads under government control, political influences have had little effect on his actions. In fact, the Railroad Administration has stood out in marked contrast with most other branches of government service of equal magniture in its freedom from political influence. In this respect government control may be assumed to have been tried under the most favorable conditions.

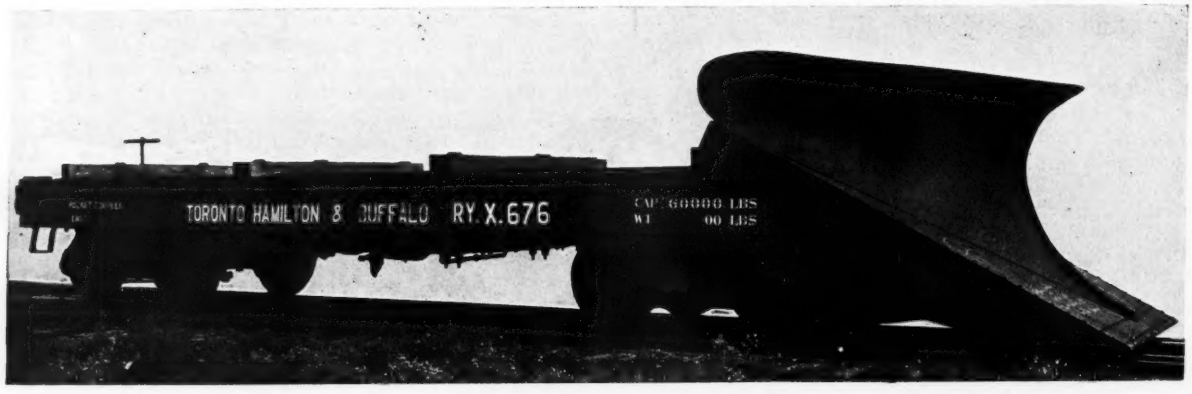
Mr. McAdoo has developed the organization of the Railroad Administration and has carried it through the most trying period of war-time conditions. The Administration is now confronted with new conditions incident to the reconstruction period which the country is entering and the general rehabilitation of the railroad properties made necessary by their neglect during the year now closing. Mr. McAdoo has brought the roads through the first period successfully. His successor faces a problem of scarcely lesser magnitude and without the patriotic inspiration of a war to aid him.

Mr. McAdoo was born near Marietta, Ga., on October 31, 1863. He was educated at the University of Tennessee. In May, 1882, he was appointed deputy clerk of the United States Circuit Court for the southern division, eastern district of Tennessee. In 1885 he was admitted to the bar, and he practiced law at Chattanooga, Tenn., until 1892, when he removed to New York and engaged in the practice of law and later as president and director of the Hudson & Manhattan Railroad, in the work of financing and constructing the Hudson river tunnel system, which was completed on March 8, 1904. Later Mr. McAdoo became prominently identified with the Democratic political activities. He was acting chairman for the greater part of the campaign which resulted in the election of President Wilson in 1912. On March 6, 1913, he became secretary of the treasury in President Wilson's cabinet. Mr. McAdoo is also ex-officio member of the Federal Reserve Board, chairman of the Federal Farm Loan Board and chairman of the United States section of the International High Commission.

A DETACHABLE SNOW PLOW THAT FITS STANDARD EQUIPMENT

DURING THE COLD WEATHER of last winter, when more than the usual difficulties were encountered in keeping the tracks free from snow and ice, the Toronto, Hamilton & Buffalo used some special equipment in fighting the severe snow storms encountered in the Canadian territory of that road, a part of which is shown in the photograph. This is a Q. & C. "Ray" snow plow applied to a heavy flat car. On its under side the plow carries a flanger, as a part of the plow, designed to clear the snow to the full width of the track. The flanger is air operated.

One of the features of this equipment is the ease and rapidity with which it may be applied to standard equipment and detached after serving its purpose. The Bingham & Garfield Railway use this equipment attached to Jordan spreaders and locomotives in combating the snow on its lines. During the winter of 1916-1917 snow conditions were unusually severe on that line. The spreader with its plow was started December 18 and during the next 90 days the apparatus was operated 82 days. In addition to keeping the main line, sidings and yards of this road clear, the spreader was used to keep open the tracks at the Utah Copper mine. These tracks are on the side of a mountain and practically encircle it. At many times the snow on this line was so deep that it was necessary to put a Mallet engine with a tractive force of 107,000 lb. behind the spreader. At other places drifts 10 to 12 ft. high formed overnight. With the wedge plow and the spreader it is generally possible to buck the snow out without the use of labor.



THE PLOW ATTACHED TO A FLAT CAR

RAIL FAILURE STATISTICS FOR 1917*

BY M. H. WICKHORST

Engineer of Tests, Rail Committee, American Railway Engineer Association, Chicago

THIS REPORT DEALS with the statistics of rail failures collected for the year ending October 31, 1917, furnished by the railroads of the United States and Canada, in response to a circular sent out by the American Railway Association. The information furnished by each railroad showed the number of tons laid of each year's rolling from each mill, the equivalent number of track miles, and the total number of failures that occurred in each year's rolling from the date laid until October 31, 1916.

*Abstracted from Bulletin No. 209 of the American Railway Engineering Association.

The failures were divided into four classes, namely, head, web, base and "broken." The reports cover rollings for 1912 and succeeding years, and the ages of the rollings in track would average about as shown below:

1912	5 years	1915	2 years
1913	4 years	1916	1 year
1914	3 years	1917	Several months

The tonnages represented by the statistics in this report are shown below:

Year rolled	Bessemer	Open-hearth	Total
1912	211,125	1,308,601	1,519,726
1913	154,412	1,647,659	1,802,071
1914	60,654	1,073,098	1,133,752
1915	12,141	1,075,111	1,087,252
1916	41,737	1,219,694	1,261,431
1917	14,613	681,669	696,282

The table below shows the comparative performance of Bessemer and open-hearth rails in failures per 100 track miles; the relative failures of Bessemer rails are also indicated by figuring the failures of open-hearth rails as 100:

		Failures per 100 track miles		Comparative failures	
Year rolled	Years service	Open-hearth	Bessemer	Open-hearth	Bessemer
1912	5	102.7	134.1	100	131
1913	4	68.5	79.7	100	116
1914	3	30.8	70.2	100	228
1915	2	19.0	19.8	100	104

A summary of the general results as given in the reports for 1913 to 1917, inclusive, is submitted in the following table showing the average failures per 100 track miles of the rollings for the several years, including both Bessemer and open-hearth rails:

Year	Years service					
Rolled	0	1	2	3	4	5
1908	....	....	....	....	....	398.1
1909	....	....	....	....	224.1	277.8
1910	....	....	....	124.0	152.7	198.5
1911	....	....	77.0	104.4	133.3	176.3
1912	....	28.9	32.1	49.3	78.9	107.1
1913	2.0	12.5	25.8	44.8	69.5	....
1914	1.2	8.2	19.8	32.9	....	....
1915	0.7	8.9	19.0	....	....	....
1916	1.6	11.8	....	....	....	....
1917	5.3	....	....	....	....	....

It will be noted that the 1908 to 1912 rollings show successively decreased numbers of failures compared on a basis of five years' service, and the rollings for 1913 and 1914 also show successively decreased failures when compared on a shorter period of service. The more recent or "wartime" rollings, however, are not starting out so well, although the final performance can only be told after they have been in track a sufficient time.

A Study of Wooden Water Tanks*

Considerations Affecting Design, Construction and Decay. The Use of Creosoted Timber and Records of Service

By C. R. Knowles,
Superintendent of Water Service, Illinois Central, Chicago

While discussions of steel and concrete tanks occupy a place in the great mass of engineering literature, it is surprising to note that but little has been written on the subject of wooden tanks, notwithstanding the fact that the wooden tank antedates both the steel and the concrete tank by many years. It is apparent that wooden tanks have been neglected by writers on engineering subjects except to the extent of publishing certain specifications and designs. The subject appears to be a timely one in view of the present steel situation and the fact that the concrete tank has not been developed to such an extent that it can replace either steel or wood entirely in tank construction.

Within the past few years steel tank construction had reached a point where it had largely supplanted the wooden tank on railroads on account of the low cost of production, improvements in design and the increasing scarcity of suitable timber. The unprecedented conditions growing out of the world war have resulted in greatly increasing the cost of steel tanks and this increased cost and the uncertainty of delivery have compelled many railroads to again give consideration to wooden tanks. Although conditions relative to the available material for wooden tanks have not improved there seems to be sufficient material to supply the demand and while the price has shown an increase in cost it has not kept pace with the cost of steel plates. A surprising feature of the situation has been the fact that the manufacturers of wooden tanks do not appear to be alive to the situation and the opportunity to push their product. In spite of this apparent apathy on the part of the wooden tank manufacturers there has been a decided increase in wooden tank construction on railroads, which has been further augmented by the ruling of the Railroad Administration prohibiting the use of steel plates for the construction of water or oil tanks, except in high tanks where steel is essential.

The increased activity in the construction of wooden tanks, together with the growing demand in other lines for timber formerly used in tank construction, naturally resulted in greatly increased costs and scarcity of suitable tank timber, especially for the larger sizes of tanks. The result has been that cheaper timber of shorter life is being used and the standards of wooden tank construction have been materially lowered. The solution of the problem appears to be the use of treated timber for the construction of tanks where suitable timber is not available; at least until the present world war is brought to a conclusion.

Heart red cypress, of course, leads all available timbers in tank construction for long life, although the scarcity of this admirable timber is growing more apparent year by year. Redwood is beyond a doubt second only in permanency to cypress; in fact, many engineers on the Pacific coast maintain that redwood is as durable as cypress for tank construction and point to redwood tanks 40 years old and still in service as verification of their claims. Douglas fir and southern heart pine are about of equal value as tank material with a life of approximately 10 years.

*Abstracted from a paper presented before the American Railway Bridge and Building Association Convention in Chicago on October 15, 1917.

Design

Wooden tanks are generally built circular in form, as this shape is more simple and economical in construction than any other form, the simplicity and economy being chiefly in the reinforcing required. A rectangular tank would probably not require any more framing than a circular tank, but would require a great deal more reinforcing than a circular tank of the same capacity, although many rectangular tanks have been built.

The Philadelphia & Reading at one time adopted as its standard a rectangular or box tank, 15 ft. wide, 29 ft. long and 8 ft. deep inside measurements. The capacity was 26,000 gal. The advantage claimed for this style of tank was that it was cheaper to build than the circular tank and did not require as high a class of labor for erection. While this may have been true a few years ago when labor, lumber and iron were cheap, the opposite is the case to-day, and square tanks are rarely constructed except in small sizes for emergency stations where material is not available for the construction of circular tanks.

There has been but little change in the design of circular wooden tanks since their first construction, as it is obvious that this type of tank will permit of but slight modifications, although there has been a wide variation in size, the capacity increasing with the greater demand for water and the necessity for additional storage. The only marked change in wooden tank construction from the earliest form to the present type has been that of eliminating the taper of the staves. Up to within a very few years ago all wooden tanks were constructed with tapering staves, making the tank smaller at the top than at the bottom, the original reason for this being that the hoops were not provided with lugs and bolts, but were riveted to the required diameter and driven down on the taper of the tank until they were tight as in driving a hoop on a barrel. The sectional hoop with lugs and bolts replaced the solid hoop, as it was found more satisfactory, especially for the larger tanks. The sectional hoop eliminated the necessity for tapering tanks, and the great majority are now built with the top and bottom of the same diameter, although a few roads have clung to the taper tank, probably from force of habit.

There have, of course, been certain modifications in the design of staves, hoops, etc., that have not materially changed the design of the tank. One of these is a non-shrinking stave, being made with a deep channel or groove in the top. This groove is filled with water from the pump discharge, which passes into the pores of the wood, keeping the top of the staves moist even when the tank is only partly filled and preventing shrinkage.

Wooden tanks are commonly constructed in practically all sizes up to 30 ft. in diameter and 20 ft. staves, and in some few instances in larger sizes. A 20-ft. by 30-ft. tank with a capacity of 100,000 gal. would appear to be the economical limit. If it is desired to build a wooden tank of greater capacity than 100,000 gal. the increased

capacity should be gained by increasing the height of staves rather than the diameter of the tank. The longer stave would require more hoops and closer spacing, while an increased diameter would require thicker staves and bottom plank to maintain the required factor of safety, and if a much greater diameter were obtained bracing of the staves would be required to preserve the circular shape of the tank, as the pull of the hoops has a tendency to flatten the walls and throw the tub out of shape. Also the additional load would require a stronger tower. The additional cost of storage per thousand gallons would probably be more than if two or more tanks were constructed. Therefore, it is generally conceded that the construction of units within a capacity of 100,000 gal. represents the most economical construction. There is also a certain advantage in having two or more tanks, as one tank may be taken out of service while being cleaned or repaired, without interruption to service.

DECAY OF TANKS

When the fibers of the wood comprising a tank are thoroughly saturated with water, decay is practically impossible; on the other hand, if the wood was perfectly dry there would be little likelihood of decay. In water tanks, however, there is always an intermediate condition of moisture in which the wood is dry on the outside and wet on the inside, thus promoting rapid decay unless the timber has been carefully selected and has a relatively long life.

It is difficult to point out any portion of the tank more susceptible to decay than another, although decay in the tops of the staves is more noticeable, and the timber probably decays more quickly here than in any other part of the tank. If this is true it is very likely caused by a wider variation in the degree of saturation owing to the tank being filled and emptied. One of the arguments put forth in favor of roofs on tanks is the protection given the tops of staves. This advantage is extremely doubtful, as the only function it can perform is to keep the staves dry, which is obviously impossible in a tank used for the storage of water. The most effective method of preventing early decay in wooden tanks is the careful selection of timber having a relatively long life or treating the timber to prevent decay. Poor inspection of timber is responsible for much of the decay in wooden tanks. A few poor staves in a tank will cause trouble, even if the remainder of the staves are perfect.

An interesting feature is brought in connection with a 16-ft. by 24-ft. white pine tank taken down after 30 years' service. It was necessary to renew the entire tank, but it was found that the staves on the north side of the tank were in much worse condition than any of the rest; the reason for this is given that the north side was always shaded, which allowed moss to accumulate and assist decay. Another instance is quoted where heart cypress with an ordinary life of over 30 years failed from decay in 15 years owing to water shortage, causing the tank to remain dry at periods several times each year.

CREOSOTED WATER TANKS

The Illinois Central has recently started to use creosoted timber in the construction of its standard wooden water tanks. Nine of these tanks constructed during the past year proved so successful that this road is now building more and has practically made the creosoted tank its standard. Creosoted tanks were resorted to on account of the high price and great demand for steel for other purposes than tank construction, and the scarcity and cost of timber that would be suitable for use without treatment.

Although there are many different timbers commonly used in the construction of water tanks, there are but few available in suitable sizes and lengths to be used in the construction of large tanks, and when the life of the timber is considered this list may possibly be reduced to two—cypress and redwood. The great demand for these timbers has been such that the price has advanced rapidly and suitable lengths are difficult to obtain. Undoubtedly the timber situation will grow worse as the war continues. Thus the use of lower grade timber that will take treatment readily appears to be a timely move. The construction of these tanks was described in an illustrated article in the *Railway Maintenance Engineer* for August, 1918, page 272.

FROST PROOFING

A wooden tank is in itself a certain protection against frost. No frost proofing is required for the tank proper throughout the greater portion of the country and in few cases is any required, even where the most severe cold weather prevails, providing the consumption of water each 24 hr. equals the capacity of the tank. This, of course, applies only to the tank, as the inlet and outlet pipes will have to be protected against frost where a freezing temperature exists. The most effective frost box is one constructed with one or more air spaces. The walls should be of dressed and matched lumber and lined with building paper to make them as air tight as possible. More frost protection is always required where surface water is used than with water from wells, as the temperature of well water is usually above 50 deg. F., while the temperature of surface water is often only slightly above the freezing point.

No set rules may be applied to frost protection, as weather and other conditions vary so widely throughout the country that uniform practice is out of the question. The factors governing are: (1) Source of supply and initial temperature of water. (2) Minimum temperature prevailing and duration of temperature below freezing, always remembering that a temperature of 20 deg. below zero maintained for two weeks offers a far more serious problem in frost proofing than 40 deg. below for two days. (3) Size of inlet and outlet pipes, and whether flow of water is continuous or intermittent. (4) Consumption of water in relation to the storage capacity of tank. Wherever possible artificial heat should be dispensed with, as stoves are responsible for more than 50 per cent of the tank losses from fire.

FIRE RISK

While a wooden tank may be destroyed by fire as readily as any other frame structure when exposed to a fire hazard it is not the great fire risk that it is popularly supposed to be. An analysis of the tank fires occurring over a period of ten years on a railroad having 341 wooden tanks in service is as follows:

Number of wooden tanks	341
Insurable value	$591,517.00
Average insurable value per tank	1,734.60
Total fire loss 10 years	22,635.52
Average loss per tank, per year	6.64
Per cent loss to total value	.38

During this period there occurred 17 tank fires, 10 of which resulted in the total loss of the tank or an average of one each year, which would indicate that the chances of a tank being destroyed by fire are in a ratio of about 1 to 350.

While the record of tank fires given above is not one to be proud of, it is probably representative of the railroads of the country, although it is expected that the loss can be kept well below the above figures by making a

careful analysis of the causes and applying preventive measures.

Analysis of the causes of the fires is as follows:

6	fires	caused	from	thawing pipes	Total loss	$11,780
3	"	"	"	overheated stoves	" "	4,850
3	"	"	"	sparks	" "	2,775
1	"	"	"	cleaning lamps	" "	1,700
1	"	"	"	tramps	" "	1,500
2	"	"	"	foreign exposure	" "	29
					Total	$22,635

It will be noted that 52 per cent of the losses were caused from thawing frozen pipes, 21 per cent from overheated stoves used to keep the tanks and pipes from freezing and 8 per cent from cleaning lamps under the tanks, or a total of 81 per cent of the losses may be charged directly to carelessness. If we include the fire caused by tramps we have a loss of $19,830, or 88 per cent of the total in 10 years, for which no reasonable excuse may be offered. It is interesting to note that 13 of the fires occurred during the winter months, 4 in November, 3 in December and 6 in January, with a loss of $19,830, or nearly nine-tenths of the total, indicating that the danger from fire is almost wholly confined to the winter months and that protection from frost is also a protection against fire.

LIFE OF WOODEN TANKS

A letter of inquiry requesting information as to the life of wooden tanks was sent to 45 railroads and 27 answers were received. While much valuable information was obtained from the replies to the letters, the figures and estimates given as to the life of tanks were almost as many as the replies received. It should not be assumed that the figures given for the life of tanks were incorrect, as the information submitted was undoubtedly as accurate as it was possible to give.

The variation in the figures submitted on the life of timber on various railroads goes to show that no accurate estimate may be made on the life of tank timber that will apply to all sections of the country. It is characteristic of timber that it is more durable when used in the region in which it is grown than when used elsewhere, for nature seems to have fortified the timber against decay to a certain extent when it is kept in its native climate.

One railroad reports 77 redwood tanks in service in California ranging from 26 to 48 years old, while another road reports redwood tanks renewed in Wisconsin after only 15 years of service. Twelve white pine are reported in service in Michigan with an average life of 35.4 years, while it has been necessary to replace white pine tanks in Missouri after 12 to 13 years. A Texas road reports 5 cypress tanks in service which are 31 years old, 8 30 years old and 3 29 years old, while several eastern roads fix the maximum life of cypress at 25 years.

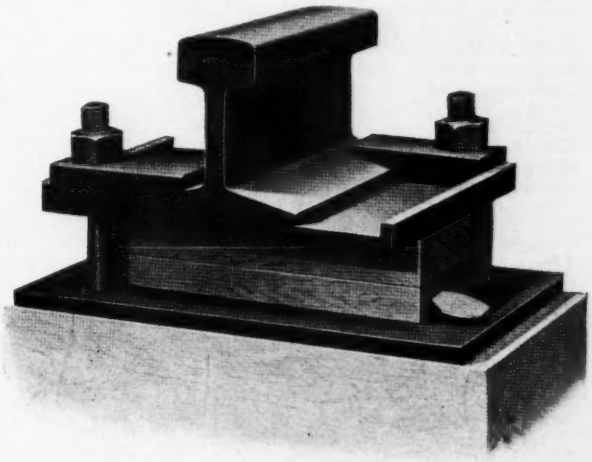
Hoops

Tank hoops in general use are principally confined to four different shapes—round, half round, oval and flat. Even when a road adopts a certain shaped hoop it may not be of the same dimensions as the hoop used on another road. It would appear that flat hoops would be fairly uniform in dimensions, but there is probably more variation in flat hoops than any other shape. In thickness they range from ⅛ in. to ⅜ in. and in width from 3 to 6 in. Some roads use a uniform thickness with a varying width; on others the hoop is uniform in width with a varying thickness, while still others use varying widths and thicknesses and to make matters worse there is much variation in the spacing and length of sections.

There are many reasons why the standardization of tank hoops would be advantageous, chief of which is the conservation of steel; not that the standard hoop would require less steel to maintain the required fiber stress on the hoop, but that it would allow the manufacturers to carry less stock to fill orders. On a recent visit to the plant of a large tank manufacturer it was found that he had on hand material to supply hoops for perhaps 30 or 40 tanks representing a dozen different hoop standards, yet he could not ship two sets that were badly needed until steel was received from the mill to make up the particular type of hoop required. The standardization of tank hoops should have a tendency to lower the cost of manufacture and insure better deliveries and would, no doubt, result in a better and more uniform quality of material. It would appear that there is every reason why tank hoops should be made standard and no good reason why they should not be.

A NEW TRACK SHIM

IN TRACK ballasted exclusively with either gravel or cinders or when the stone ballast is shallow under the ties, there is more or less heaving of the track in winter due to freezing and thawing. This destroys the surface of the track. The present practice for remedying this is to place wooden wedges under the rail for light shimming and for heavy work long slabs, which are spiked to the ties and the rails spiked to the slabs.



THE "TRASCO" ADJUSTABLE SHIM

The use of slabs does not permit of any adjustment and the track which is smooth one week may be rough the next.

A device to overcome the deficiencies in the present practice known as the "Trasco" adjustable track shim is manufactured by the Track Specialties Company, New York. It consists of a bottom plate, securely spiked to the tie; a flat shim and two wedge shims; a top plate upon which the rail rests, and two clips which secure the rail to the top plate. The top plate is fastened to the bottom plate by two bolts, heads down, and countersunk in the bottom plate, with the nuts placed over the clips holding the rail, thus securing the entire device.

It is claimed that this device is safe, no matter how high the shim, as the full benefit of the spikes is obtained through the bottom plate, and the rail is always securely held by the clips, which prevent it from sliding or overturning. It also has the advantage of allowing adjustment in height to any degree of fineness desired, by simply loosening the nuts and driving the wedge

shims, again tightening the nuts after the desired height is obtained. Thus, inequalities can be corrected as often as necessary and the track maintained in good surface.

PREPARATION FOR THE RAILWAY SUPPLY SHOW

PLANS for the next annual exhibit of the National Railway Appliances Association, to be held at the Coliseum, Chicago, on March 17-20, inclusive, simultaneous with the convention of the American Railway Engineering Association, took definite form at a meeting of the board of directors of the Appliances Association on November 12. An indication of the interest taken in the exhibit is given by the fact that 117 of the firms holding membership have indicated their intention of exhibiting and were awarded space at the meeting. A list of these firms appears below:

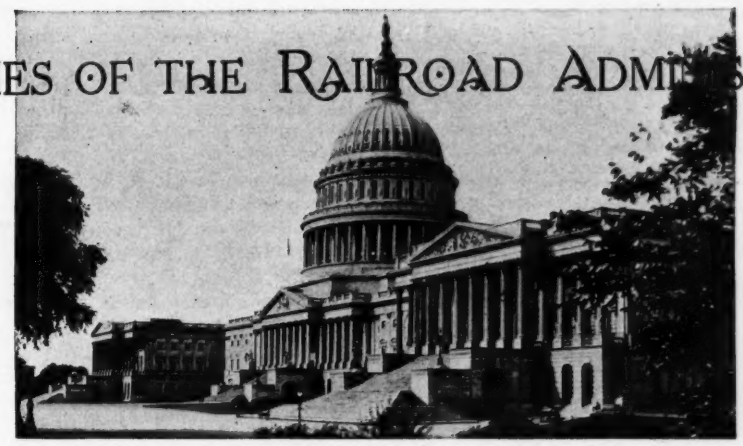
Adams & Westlake Company.
Adams Motor Manufacturing Company.
A. G. A. Railway Light & Signal Company.
Air Reduction Sales Company.
Ajax Rail Anchor Company.
Alexander Milburn Company.
American Abrasive Metal Company.
American Hoist & Derrick Company.
American Steel & Wire Company.
American Valve & Meter Company.
Anchor Company.
Armco Iron Culvert & Flume Manufacturers' Association.
Associated Manufacturers of Malleable Iron.
Austin Company, The.
Balkwill Manganese Crossing Company.
Benjamin Electric Manufacturing Company.
Bethlehem Steel Company.
Buda Company, The.
Burden Iron Company.
Bryant Zinc Company.
Camp, E. M.
Carbic Manufacturing Company.
Carnegie Steel Company.
Cast Iron Pipe Association.
Chicago Bridge & Iron Works.
Chicago Flag & Decorating Company.
Chicago Malleable Castings Company.
Chicago Railway Signal & Supply Co.
Chipman Chemical Engineering Company.
Cleveland Railway Supply Company.
Crerar, Adams & Co.
Diamond State Fibre Company.
Dickinson, Paul, Inc.
Duff Manufacturing Company.
Edison Storage Battery Company.
Electric Storage Battery Company.
Edison, Thos. A., Inc.
Fairbanks, Morse & Co.
Fairmont Gas Engine & Railway Motor Car Company.
Federal Signal Company.
Frictionless Rail, The.
General Electric Company.
General Railway Signal Company.
Graver, Wm., Tank Works.
Grip Nut Company.
Gurley, W. & L. E.
Hall Switch & Signal Company.
Hegeman-Castle Corporation.
Hatfield Rail Joint Manufacturing Company.
Hayes Track Appliance Company.
Hubbard & Co.
Hazard Manufacturing Company.
Ingersoll-Rand Company.
Johns-Manville Company, H. W.
Jordan Company, O. F.
Kalamazoo Railway Supply Company.
Kaustine Company.
Kelly-Derby Company.
Kilbourne & Jacobs Manufacturing Company.
Keystone Grinder Manufacturing Company.
Kerite Insulated Wire & Cable Company.
Lackawanna Steel Company.
Layne & Bowler Company.
Lipman Refrigerator Car & Manufacturing Company.
Long, Chas. R., Jr.
M. W. Supply Company.
Macomber & Whyte Rope Company.
MacRae's Blue Book Company.
Madden Company.
Marsh & Truman Lumber Company.
Massey Company, The C. F.
McGraw-Hill Publishing Company.
Miller Train Control Corporation.
Mercury Manufacturing Company.
Monroe Calculating Machine Company.
Mudge & Co.
National Carbon Company.
National Lead Company.
National Lock Washer Company.
National Malleable Castings Company.
Northwestern Motor Company.
Nichols, Geo. P., & Bro.
National Surface Guard Company.
Ogle Construction Company.
Okonite Company.
O'Malley-Beare Valve Company.
Page Steel & Wire Company.
Pittsburgh-Des Moines Steel Company.
Pocket List of Railway Officials.
Positive Rail Anchor Company.
Protective Signal Manufacturing Company.
Pyrene Manufacturing Company.
Q. & C. Company.
Rail Joint Company.
Railroad Supply Company.
Railway Review.
Reading Specialties Company.
Signal Accessories Company.
Simmons-Boardman Publishing Company.
Southern Pine Association.
Squire Cogswell Company.
Snow Construction Company., T. W.
Standard Asphalt & Refining Company.
Standard Underground Cable Company.
Toledo Scale Company.
Track Specialties Company.
Templeton, Kenly & Co.
Underwood Typewriter Company.
Union Switch & Signal Company.
U. S. Wind Engine & Pump Company.
Verona Tool Works.
Volkhardt Company.
Walls Frogless Switch & Manufacturing Company.
Waterbury Battery Company.
Wayne Oil Tank & Pump Company.
Western Electric Company.
Wyoming Shovel Works.

British Ministry of Information.

BRITISH RAILROAD ENGINEERS BUILDING A PILE TRESTLE IN FRANCE

ACTIVITIES OF THE RAILROAD ADMINISTRATION

Rail Distribution and Orders for Next Year Are Being Studied



Preparations Made to Record Character and Amount of Maintenance Work Done

WAGE CONTROVERSIES, working conditions and other matters having to do with employment continue to take a large part of the time of the Railroad Administration. In General Order No. 53 the director general provides for the organization of Board of Adjustment No. 3 to adjust controversies growing out of the interpretation or application of the wage schedules to maintenance of way employees and others. The prerogatives of this board will be similar to those of Boards No. 1 and 2. The officers and members of this board are as follows: H. A. Kennedy, chairman; T. H. Gerrey, vice-chairman; Richard P. Dee, E. A. Gould, S. N. Harrison, F. Hartenstein, G. E. Kipp, W. A. Titus.

Order No. 51 issued by the director general provides the manner in which the seniority rights of employees who enter military service shall be preserved.

(1) In order that as nearly as practicable there shall be a uniform treatment of this matter, the following general principles will govern:

(a) In the case of an employee having established seniority rights, so far as practicable, and where the employee is physically qualified, he will be restored to such seniority rights.

(b) In the case of employees who do not have seniority rights under existing practices, a consistent effort will be made to provide employment for them when mustered out of military service.

(2) Upon railroads where the assurances given on this subject have been more specific than the provisions of paragraph 1 hereof, such assurances shall be observed.

Order No. 102 of the Southwestern region and Order No. 3000-436 of the Eastern region provide that employees transferred outside the scope of the pension or benefit systems under which they were previously employed shall be protected against loss of pensions or similar benefits. These orders provide that such transferred employee will retain the benefits of the same pension or similar system as attached to his previous employment provided he complies with such conditions, if any, with respect to payments, etc., as may be obligatory upon him under such a system.

In a circular dated October 31, the Central Western regional director announces that the increases of 25 per cent recently granted to the roadmasters has also been authorized for supervisors of bridges and buildings; the same increase will be given to master carpenters who have heretofore received a monthly salary and have been classified as officials. The increase is retroactive to June 1.

In Order 113, the Southwestern regional director announces that maintenance of way forces, including section and entra gangs, and those in the bridge and building department and other departments of maintenance of way service will work under a nine-hour day, effective November 11.

According to the director general, orders have been issued to the regional directors that, beginning not later than January 1, 1919, all railroad payrolls which are now being paid on a monthly basis shall be paid semi-monthly.

Notice of Improvements to Go to Corporate Organizations

Because the contracts between the Government and the railroad companies provide for the giving of prompt notice to the corporate officers of the ordering of additions, betterments or road extensions costing more than $1,000, William G. McAdoo, director general of the railroads, has issued a modification of Paragraph 5 of General Order No. 12 dated March 21, relative to the method for giving such notice. This provides that a copy of any requisition for authority for such work shall be mailed to the president of the company before beginning the work or acquiring any property, except in cases of emergency, or in cases where the delay would be detrimental to the Government, the service or the company.

Organization of the Purchasing and Stores Departments

Order 108 of the Southwestern regional director and Circular 195 of the Central Western regional director outline a plan for the organization of the purchasing and stores departments as agreed to by the director of the Division of Finance and Purchases and the director of the Division of Operation of the Railroad Administration:

1. The purchasing department shall be in charge of a general purchasing agent or purchasing agent reporting direct to the federal manager, or general manager where there is no federal manager in charge.

2. The purchasing agent, in co-operation with the regional purchasing committee, shall buy all material and supplies, including fuel, dining car and restaurant supplies, and sell all scrap and obsolete material, including equipment. He shall also have direct charge of the handling of scrap and the reclaiming of usable material.

3. He shall be responsible not only for the purchases and sales, but for the quantity of material on hand, the custody, care and distribution thereof, and charges therefor, and necessarily shall have charge of all material not in actual use and of the storehouses and other places where material is stored.

4. He shall be aided by and shall appoint a general storekeeper and other necessary assistants, such as fuel agents, stationers, tie and timber agents and commissary agents, who shall report to the purchasing agent direct.

5. An exception as to paragraphs 3 and 4 may be made, with approval of the regional director, upon railroads where the store

department is separately organized, and now reporting direct to the federal manager.

6. All storekeepers and all others, more than half of whose time is devoted to the handling or accounting for material, shall be appointed by and be under the charge of the general storekeeper and on his payroll.

7. All appointments of purchasing agents, general storekeepers, fuel agents, and tie and timber agents, shall be subject to the approval of the regional director.

8. The regional purchasing committee, with the approval of the regional director, shall appoint a supervisor of stores to have general supervision over the stores department and reporting direct to the regional purchasing committee.

INDUSTRY TRACKS

The Southwestern regional director, in Supplement 1 to Circular 102, states that in special cases when an industry desires a track constructed for temporary use which is not necessary from the standpoint of the railroad, it may be arranged to have the industry bear the entire expense of the construction of the track, including the cost of the turnout. When such a temporary track is removed, the industry will be credited with the value of the salvaged material less the cost incurred in removing it. Cases of proposed industry tracks of this character are to be reported to the regional director for approval.

In Order 101, the Southwestern regional director calls attention to a suggestion by a safety committee on one of the Southwestern roads that a board be installed at switch stands of tracks leading into industries where there is not sufficient clearance, reading, "These buildings will not clear a man on top or side of cars." The regional director suggests that unless something better is in use, this board be installed on all roads in his region.

FOREST PRODUCTS SECTION TO DISTRIBUTE CREOSOTE

The War Industries Board has issued a circular of regulations intended to set forth a definite working arrangement for the distribution of creosote due to the present shortage. The board and the Railroad Administration have felt the need of closer co-operation with the industry and it is expected that the arrangement will provide prompt deliveries to the government and war industries and in general relieve the situation with the least possible interference with existing trade conditions. Creosote has been placed on the clearance list and requirements of the army, navy and Emergency Fleet Corporation will be allotted by a section of the War Industries Board. With the approval of the priorities commissioner, producers are required to give preference, first, to direct orders of the army, navy and Emergency Fleet Corporation, and, second, to direct orders of railroads and of other transportation facilities under the direction of the Railroad Administration and to direct orders of telegraph and telephone companies under control of the post office department. Harbor commissions and war industries requiring creosote for use on direct government account will submit applications to the board.

The Railroad Administration has adopted a program of conservation and substitution of materials in the treating of ties, etc., which will undoubtedly result in a considerable saving of creosote. The Forest Products Section of the Central Advisory Purchasing Committee will receive the allotment for railway uses and will distribute it for all railway work and work under the direction of the Railroad Administration and when deemed necessary will divert shipments under contract from one road to another.

RAIL DISTRIBUTION

C. A. Morse, assistant director of the Division of Operation in charge of engineering and maintenance, is now giving close attention to the distribution of new rail. Because of the congestion in the steel mills, no new orders for rails have been placed this year and deliveries will be made on only about 1,200,000 tons of a total of 2,000,000 tons under previous contracts for 1918 rolling. Thus less than one-half of a normal year's requirements will be secured. Rollings have been at the rate of less than 25,000 tons per week for most of this year. Plans had recently been made to increase this to 35,000. to 40,000 tons weekly during November, but the receipt of orders for rails for our forces overseas has forced the mills to divert this extra tonnage there. Undoubtedly this will soon be subject to change.

The orders now being rolled were placed two or three years ago. In general, they are well distributed among the roads of the country, although in some instances lines now badly in need of rails have none under contract. An attempt is being made to divert some of the rail to those lines on which it is most needed, the Detroit, Toledo & Ironton and the Grand Trunk Western being among the roads which are receiving rail diverted from the Erie and other roads. Approximately 65 per cent of the present output is now being given to the lines in the Eastern region, orders being largely concentrated on the roads in this and the Northwestern regions in order that they may get as much of this rail as possible into the track before winter. About December 1 it is expected that the mills will be turned on to orders for Southern roads where rail can be laid throughout the winter. In addition to the 1918 orders yet unfilled, there are 473,000 tons now on order for 1919 delivery. With the demand for steel for war uses lesseend, it is expected that deliveries will soon be made at the rate of 50,000 tons a week.

Under instructions from Washington the rail mills will not accept orders for new rail from individual railways and it is up to the individual lines to indicate on their 1919 budgets the new rail which is actually required for safety purposes only. After the budgets for all the railroads have been received in Washington the allotment of rail to the different railroads will be handled by the Railroad Administration officers.

The price of steel rails is an unsettled question which is still under consideration by the price-fixing committee of the War Industries Board. The committee some time ago recommended a price of $56 a ton, based on a cost figure which would allow a profit to the less efficient mills, but the Railroad Administration objected on the ground that this would represent too large a profit on most of the product. Apparently this position was supported by the President, to whom Mr. McAdoo referred the matter several weeks ago. As probably 80 to 90 per cent of the new rails would be charged to operating expenses and borne by the Railroad Administration, it is showing much reluctance towards paying the higher prices.

DATA REQUESTED FOR MAINTENANCE RECORDS

For the purpose of making a record of the amount and character of maintenance of way work performed on the railroads during federal control and during the three-year period ending June 30, 1917, in order to comply with the provisions of the federal control law requiring that the railroads be returned to their owners in substantially as good condition as when they were taken, the Division of Operation has issued circular No. 22 directing the roads to send to C. A. Morse, assistant director of the division in charge of engineering and maintenance, the following information, not later than December 31, 1918, as to each property for the fiscal years ended June 30, 1915, 1916 and 1917, and also the calendar year 1918:

1. Name of corporate companies, comprising each property, that make separate annual reports to the Interstate Commerce

Commission, with their principal termini, limits and total miles of road.

2. List of operating divisions separated as between main and branch line mileage and side track mileage. Where there is more than a single main or branch line main track, mileage should be given separately for each additional main track. The termini limits of the main lines should be stated. If a division includes portions of two or more corporate companies, information should be divided to cover each corporation.

3. Gross ton-mile freight traffic and car-mile passenger traffic, by divisions, divided into main and branch line traffic, to be given separately for each of the four years.

4. Division charts to be furnished for main and branch lines showing rail in each main track December 31, 1917, with year laid, kind, section, weight per yard, and whether new or relayers when laid. Charts should be 8 by 10½ in., or multiples for folding to that size, with 1 in. on left side for binding.

5. Division charts to be furnished for main and branch lines showing ballast in each main track December 31, 1917, with kind and depth of ballast. Charts should be 8 by 10½ in., or multiples for folding to that size, with 1 in. on left side for binding.

6. How many cubic yards of ballast of each kind inserted on each division during each of the four years, divided as between that charged to additions and betterments and that charged to maintenance, separated as follows:

a. Main lines.
b. Branch lines.
c. Sidings.

7. A. How many cross ties were inserted on each division during each of the four years separated into kinds of wood, sizes, treated and untreated, divided as follows:

a. Main lines.
b. Branch lines.
c. Sidings.
d. New work.

B. How many feet B. M. switch ties were inserted on each division during each of the four years separated into kinds of wood, treated and untreated, divided as follows:

a. Main lines.
b. Branch lines.
c. Sidings.
d. New work.

C. How many tie plates were inserted on each division during each of the four years, divided as follows:

a. Main lines.
b. Branch lines.
c. Sidings.
d. New work.

D. How many anti-creepers were inserted on each division during each of the four years, divided as follows:

a. Main lines.
b. Branch lines.
c. New work.

8. All information to be furnished on paper 8 by 10½ in., using separate sheets for answering each of the questions, and the data for each railroad to be bound together with suitable paper covers with name of road, etc., on front and bound on 10½-in. side.

Mr. Morse is not building up an extensive organization, but is working through a maintenance committee consisting of the engineering assistants to the regional directors, where such have been appointed, or of representatives from those regions where no engineering assistants have been selected. This committee consists of the following members: Eastern Region, Francis Lee Stuart; Allegheny Region, E. B. Temple; Pocahontas Region, J. E. Crawford; Southern Region, W. R. Rodenbaugh; Northwestern Region, J. C. Haugh; Central Western Region, H. R. Safford, and Southwestern Region, E. A. Hadley.

A meeting of this committee with Mr. Morse was held at Washington on November 26, to discuss the amount of information which will be required in addition to that called for by Circular No. 22, published above, in order to ascertain the amount of maintenance work carried on during the period of federal control as compared with that handled during the three-year test period. This information is necessary to enable the Railroad Administration to comply with the provisions of the federal control law requiring the roads to be returned to their owners in substantially as good conditions as when they were taken over.

PROGRESS ON ADDITIONS AND BETTERMENTS

United States Railroad Administration has issued a statement showing the amount authorized for Additions and Betterments work up to November 10, 1918, and also the amount of this money which had been expended up to and including September 30. This information is

AUTHORIZATIONS AND EXPENDITURES IN CONNECTION WITH WORK CHARGEABLE TO CAPITAL ACCOUNT AS OF NOVEMBER 10, 1918—CLASS I RAILROADS

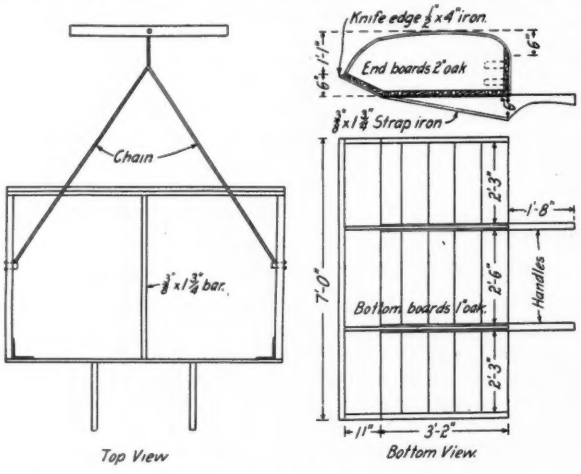
CLASS OF WORK Additions and Betterments (Excluding Equipment)	Work Specifically Authorized on D. C. E. Forms 1, 2, 3 and 4 to November 10, 1918 Chargeable to— Operating expenses	Capital account	Total	Expenditures from January 1, 1918 to September 30, 1918 Charged to— Operating expenses	Capital account	Total	Unexpended Balance Chargeable to— Operating expenses	Capital account	Total
1. Widening Cuts and Fills, Filling Trestles, etc.	$ 3,067,061	$ 7,101,168	$ 10,168,229	$ 996,780	$ 3,250,776	$ 4,247,556	$ 2,070,281	$ 3,850,392	$ 5,920,673
2. Ballasting	3,275,271	10,521,021	13,796,292	1,223,915	3,463,873	4,687,788	2,051,356	7,057,148	9,108,504
3. Rail and Other Track Material	46,056,163	31,553,047	77,609,210	8,441,692	11,574,965	20,016,657	37,614,471	19,978,082	57,592,553
4. Bridges, Trestles and Culverts	24,232,283	38,879,214	63,111,497	7,771,538	17,560,499	25,332,037	16,460,745	21,318,715	37,779,460
5. Tunnel and Subway Improvements	863,220	4,008,516	4,871,736	515,724	701,773	1,217,497	347,496	3,306,743	3,654,239
6. Track Elevations or Depressions	1,676,752	13,423,050	15,099,802	312,950	2,134,334	2,447,284	1,363,802	11,288,716	12,652,518
7. Elimination of Grade Crossings	1,183,995	11,966,544	13,150,539	318,830	2,842,244	3,161,074	865,165	9,124,300	9,989,465
8. Grade Crossings and Crossing Signals	165,667	1,439,032	1,604,699	83,142	823,820	906,962	82,525	615,212	697,737
9. Additional Main Tracks	5,780,288	57,914,301	63,694,589	1,513,549	21,669,185	23,182,734	4,266,739	36,245,116	40,511,855
10. Additional Yard Tracks, Sidings and Industry Tracks	9,281,505	114,841,142	124,122,647	2,092,494	39,128,671	41,221,165	7,189,011	75,712,471	82,901,482
11. Changes of Grade or Alignment	2,906,950	8,780,638	11,687,588	606,108	2,621,982	3,228,090	2,300,842	6,158,656	8,459,498
12. Signals and Interlocking Plants	2,420,807	13,800,195	16,221,002	629,301	4,746,873	5,376,174	1,791,506	9,053,322	10,844,828
13. Telegraph and Telephone Lines	745,318	5,520,453	6,265,771	406,890	2,046,069	2,452,959	338,428	3,474,384	3,812,812
14. Roadway Machinery and Tools	84,649	1,696,214	1,780,863	15,091	1,064,181	1,079,272	69,558	632,033	701,591
15. Section Houses and Other Roadway Buildings	208,850	2,786,560	2,995,410	85,431	1,846,772	1,932,203	123,419	939,788	1,063,207
16. Fences and Snowsheds	452,329	2,143,709	2,596,038	173,401	727,926	901,327	278,928	1,415,783	1,694,711
17. Freight and Passenger Stations, Office Buildings	3,808,314	29,245,446	33,053,760	986,534	14,050,643	15,037,177	2,821,780	15,194,803	18,016,583
18. Hotels and Restaurants	27,091	679,177	706,268	2,008	220,430	222,438	25,083	458,747	483,830
19. Fuel Stations and Appurtenances	1,109,456	7,756,753	8,866,209	320,188	2,590,363	2,910,551	789,268	5,166,390	5,955,658
20. Water Stations and Appurtenances	1,907,836	10,672,695	12,580,531	573,852	4,281,751	4,855,603	1,333,984	6,390,944	7,724,928
21. Shop Buildings, Engine-houses and Appurtenances	6,465,459	52,772,474	59,237,933	1,730,632	15,698,759	17,429,391	4,734,827	37,073,715	41,808,542
22. Shop Machinery and Tools	1,325,637	20,172,327	21,497,964	307,501	5,467,487	5,774,988	1,018,136	14,704,840	15,722,976
23. Electric Power Plants, Substations, etc.	2,072,696	20,912,341	22,985,037	321,253	4,978,991	5,300,244	1,751,443	15,933,350	17,684,793
24. Wharves and Docks	524,607	4,891,347	5,415,954	276,433	644,677	921,110	248,174	4,246,670	4,494,844
25. Coal and Ore Wharves	661,002	5,416,026	6,077,028	284,012	3,077,488	3,361,500	376,990	2,338,538	2,715,528
26. Grain Elevators and Storage Warehouses	437,163	2,668,523	3,105,686	81,321	1,972,361	2,053,682	355,842	696,162	1,052,004
27. Real Estate	15,538	579,662	595,200	1,722	555,342	557,064	13,816	24,320	38,136
28. Assessments for Public Improvements	59,180	1,955,123	2,014,303	60,662	1,086,808	1,147,470	*1,482	868,315	866,833
34. All Other Improvements	284,706	6,453,243	6,737,949	143,093	2,887,854	3,030,947	141,613	3,565,389	3,707,002
Total (excluding equipment)	$121,099,793	$490,549,941	$611,649,734	$ 30,276,047	$173,716,897	$203,992,944	$ 90,823,746	$316,833,044	$407,656,790

*Expenditure in excess of authorization.

given in the accompanying table showing specifically the amount authorized, the amount expended and the unexpended balances as subdivided between proportions chargeable to operating expenses and capital account as well as the total. From this it is seen that the total amount authorized for additions and betterments, excluding equipment, was $611,649,734, of which $203,992,944, or 33.4 per cent, had been expended by September 30, leaving an unexpended balance of $407,656,790. Including equipment and amounts authorized for construction of extensions, branches, etc., the grand total of the authorizations for additions and betterments is $1,316,249,472 and of this amount $439,348,075 was expended by September 30, or 33.4 per cent of the total.

REMOVING SNOW FROM STATION PLATFORMS WITH TEAMS

THE CHICAGO & NORTH WESTERN used a form of wooden snow scraper at a number of the larger stations on the Dakota division to remove snow from the platforms last winter with considerable economy. These scrapers were also used to clear snow from street crossings and from tracks in front of passenger stations. The scrapers are approximately 3 ft. by 7 ft. in size and 14 in. deep. They are constructed of ¾-in. oak lumber with 2-in. timbers for the ends, and are reinforced with strap iron. They will carry an average load of 1½ cu. yd. of snow. The scrapers were built at an approximate cost of $12 each.



DETAILS OF THE SCRAPER

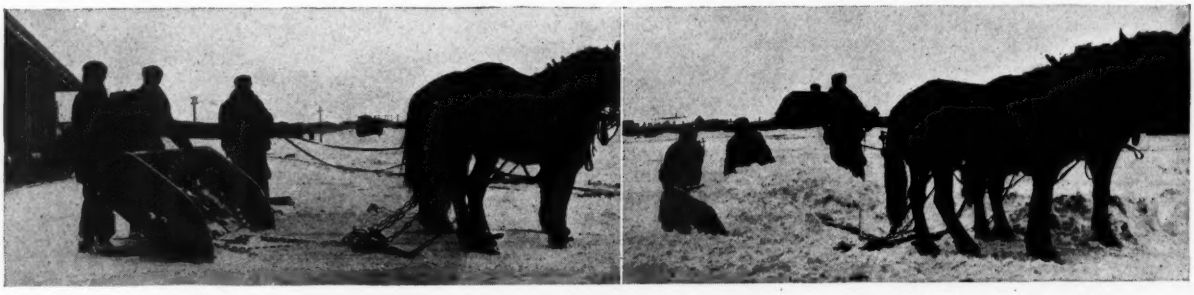
Where a considerable area is to be cleared 5 or 6 teams and scrapers are employed in one gang in the same way in which teams and slips handle earth in grading operations, a driver being assigned to each team, one extra man being employed to load the scrapers and a foreman supervising the work and maintaining a lookout for trains. It has been found that three teams and 6 men, including drivers, can remove a 6-in. fall of snow from approximately 15,000 sq. ft. of brick platform and 3 passenger tracks (approximately 1,200 lineal feet) in one day. While the cost of handling snow in this way depends largely upon the length of haul, where it can be disposed of within a short distance, the cost is not over 50 per cent of what it would be where shovelers and a work train are employed. On the basis of 60 cents per hour for a team and driver, 30 cents per hour for a laborer and 35 cents per hour for a foreman, a gang such as that outlined above it will show a saving of approximately $50 per day over a gang of 40 laborers which would be required to do the same amount of work and receiving $2.25 for a 10-hour day. Of equal importance with the economy effected is the removal of the necessity of recruiting extra labor to handle snow at a time when there is a heavy demand for it elsewhere. It is usually possible to secure a small number of men and teams readily, while more difficulty is commonly encountered in recruiting a gang of men.

INTERPRETATION OF SUPPLEMENTAL WAGE ORDERS

BECAUSE OF THE possibilities for conflicting interpretations of supplements No. 7 and 8 to General Order No. 27 (Supplement No. 8 relating to maintenance of way employees was published in the October issue, page 326), A. H. Smith, director of the Eastern region, authorized a thorough study of these supplements, as a result of which answers were prepared for many questions of ambiguity arising in their application. This report does not carry with it the authority of an order, but constitutes a careful analysis of the wage supplements and affords a useful guide in considering matters of interpretation. A summary of disputed points that are of particular interest to the maintenance of way department is given below.

In covering the scope of these supplements it is ruled that draftsmen are covered by Article VI of Supplement No. 7, and assistants on engineering corps are covered by Article II of Supplement 8 (advances of $25 per month over rates in effect on January 1, 1918, prior to application of General Order No. 27). Supplement 8 is also assumed to include camp cooks, steam shovel engineers, shovel cranemen and rail loader engineers. The wage advances granted in Article I of Supplement No. 8 are ruled to apply to construction work also.

With respect to "second hands," the ruling is that all those who had a differential of 50 cents per 10-hr. day over laborers are to be considered assistant foremen, if



TWO VIEWS OF THE SCRAPER IN USE

the character of the work justifies. In the case of track laborers who were receiving 12 hr. pay for 10 hr. work on January 1, 1918, the increase should be based upon the hourly rate in effect on January 1.

Article I of both supplements is said to apply to positions created subsequent to January 1, 1918, so that increases will be awarded similar to those for positions of similar scope or responsibility. Positions that have changed since January 1, 1918, should be reclassified and rates established as provided in Article I.

The rates provided in these supplements apply to the position rather than to the employee, except as modified by Paragraph (b) of Article VIII in Supplement No. 7 and also by Paragraph (b) in Article VI of Supplement No. 8.

Monthly rates established by the application of these supplements are to be considered as the rates for eight hours' service and cover the same number of days' work per month as of January 1, 1918.

Example—position on January 1, 1918, pays $100 per month for 12 hours' work per day, alternate Sundays off—month of 30 days, four Sundays.

New salary (28 8-hour days)	$125.00
56 hours' overtime pro rata	30.97
56 hours' overtime, time and one-half	46.45
Total	$202.42

In cases where the salary fixed by General Order No. 27 is greater than that allowed in the supplement, the salary must be reduced, as per Article VIII to Supplement No. 7 and Article VI of Supplement No. 8. In case an employee receives a higher rate under General Order No. 27 than is established by the supplement, this rate must be reduced to conform to the provision of the above paragraph. A temporary assignment is defined as one for the purpose of filling a position regularly occupied by another employee.

With regard to Article VIII of Supplement No. 7 and Article VI of Supplement No. 8:

Eight consecutive hours exclusive of meal period constitute a day's work and while it is not obligatory to reduce assignments to eight hours, overtime for service rendered in excess of eight consecutive hours will apply, as per Article VII of Supplement No. 8.

Where the regular hours of duty constitute a lesser period than eight hours, the present assignment may be continued, overtime to commence only after eight hours' work.

With regard to overtime and calls as covered in Article XI of Supplement No. 7 and Article VII of Supplement No. 8, a notification or call to work, outside of established hours, is construed to mean, notifying or calling an employee back to his position when an emergency arises which necessitate the performance of service during the interim of release from one day's service and the established time for beginning the next day's work, or on an employee's Sunday off. For such call actual time at pro rata rates with a minimum of three hours shall be paid. If required under such call to work in excess of ten hours, time and one-half shall be allowed for such excess time.

With respect to time occupied in riding trains to go from one piece of work to another, the interpretation is that such time cannot be included in calculating overtime.

The above article is also interpreted as applying to positions paying in excess of $250 per month. In calculating overtime for employees paid by the month, the method suggested is to multiply the number of days per year such employees have been regularly required to work as of January 1, 1918, without additional compensation by eight hours and divide the result into the annual compensation.

Where it has been customary to grant Saturday half holidays and employees are required to work on Saturday afternoon, such work cannot be considered as overtime unless the total time employed is more than eight hours.

In preparing the pay-roll a detailed record should be kept showing straight time, pro rata overtime, and punitive overtime separately. The method of showing the different factors of compensation on the pay-roll is a matter for the individual road to determine.

THE MATERIAL MARKET

WITH THE SIGNING of the armistice a marked change took place in the markets of all materials. While the actual cancelation of orders will proceed gradually, the fact that this will be done will have the effect of producing a buyers' market for the first time in the four years. It is true that some war orders were held up even before November 11. For instance, large orders of barbed wire for France, Italy and Great Britain were canceled. Since the cessation of hostilities further cancelations have taken place with the prospect of still more in the near future.

No changes in prices have taken place. The steel committee of the American Iron and Steel Institute asked the War Industries Board on November 15 to continue supervision of the steel industry until the readjustment incident to the stoppage of the war was completed. It is understood that this is desired in order that the transition from war conditions to those of peace may be made gradually, to avoid sudden fluctations in price, either up or down, as a result of the changing conditions.

To offset the reduction in the demand for materials for war purposes, the War Industries Board on November 12 began to modify the regulations under which it has controlled the American industries during the war. Projects from which restrictions have been removed which are of interest to men in the railway field include "all buildings, structures, roadway, plant facilities or other construction projects of every nature whatsoever undertaken by the United States Railroad Administration." All limitations on the production of building materials, including brick, cement, lime, hollow tile and lumber, have also been removed.

Of considerable influence on the lumber market is a recent action by the United States Shipping Board and the Emergency Fleet Corporation. Following a conference attended by princiual offices at Philadelphia it was announced that the program for ship building would be curtailed, particularly as it affects those ships that cannot be completed until 1920 and the yards that have failed to show "proper efficiency." Wood ship production is to be curtailed also.

One of the most definite manifestations of the change in the material market has been a great decrease in the demand for scrap iron. The situation as now obtaining also holds prospects for a marked change as to the rail situation and a more complete discussion of this subject in its present status will be found under the report on the Railroad Administration appearing elsewhere in this issue.

Announcement was made on November 20 by Bernard M. Baruch, chairman of the War Industries Board, of the formal cancelation of all outstanding priority ratings, whether under certificate or under automatic rating, except those of the Emergency Fleet Corporation, the navy, railroads, telegraph companies and telephone companies, this order becoming effective November 22. An abstract of this order appears on another page.

GENERAL NEWS DEPARTMENT

The United States Railroad Administration has ordered for 1919 delivery 600 locomotives in addition to the 1,415 which it had already ordered.

The railway mail service estimates that there will be 200 carloads or 100,000 sacks of mail arriving at New York during a 10-day period beginning about November 10, to be sent to soldiers and sailors who are in Europe or on the seas.

Senator Cummins has introduced a bill, S. 5027, to withdraw the authority heretofore granted to the President and to other departments of the government relating to priorities in transportation and to restrictions upon the sale and distribution of commodities.

The Alaska (Government) Railway is now completed for 211 miles from Seward, the gap of 15 miles along Turnagain Arm having recently been closed. The first train through to Anchorage carried Hon. Thomas Riggs, Jr., former member of the Alaskan Engineering Commission, and now territorial governor of Alaska.

The American Railway Express Company, a corporation organized to take over the business of all the larger railway express companies, following the placing of the American railways under federal management, has been taken over by the government to be operated under the direction of William G. McAdoo, director general of the railroads. This action on the part of the government followed a complaint of the employees of the express companies for higher wages, shorter hours and better working conditions.

Employees' Magazines, published by railroads for their employees, are to be delivered to all employees at the time they are paid their monthly or semi-monthly wages. This is in accordance with a recent order of the director general providing for the exercise of general supervision over the employees' magazines without interfering with the present management of each magazine. The director general's office will furnish them with a considerable amount of copy in the shape of orders, circulars and notices regarding the activities of the Railroad Administration, and in addition some special articles by members of the organization.

Naval guns, originally intended for new battle cruisers of the United States navy, were used effectively on railway mountings for land service with the armies in France. Information recently given out by Secretary of the Navy Daniels states that these guns threw a heavier projectile with a larger muzzle velocity than any previously placed on mobile shore mountings. Supports for htese guns were so arranged that while they could be hauled on cars, they were very readily removed to a form of pit foundation for firing.

Over 350 miles of railroad were built by the Spruce Production Division of the signal corps of the United States Army on the northwest coast during the past year as a means of gaining access to the great spruce forests in which lumbering operations were in progress to supply spruce for aeroplane production. More than 10,000 soldiers in the signal corps of the United States army were engaged in logging the spruce or in the construction of the railroad. It is understood that this will be one of the first activities of the United States army to be discontinued as a result of the armistice.

The National Association of Railway and Utilities Commissioners at its session on November 14 adopted a resolution which called attention to the fact that the war has closed and expressed the opinion of the association that suitable action should be taken by the Director General or the President to recognize the full and unimpaired authority of the states over intrastate rates, service and facilities of carrier properties under federal control, but that in any event it is the duty of each state commission to exercise and maintain its constitutional and statutory authority to extend which it may deem the public interest demands.

Emigration statistics prepared by the United States Immigration Service shows that the number of immigrants entering this country for the year ending June 30, 1918, was 110,618, as compared to 295,403 for 1917 and 298,826 for 1916. Immigration of races commonly recruited for railroad labor during the fiscal year of 1917 included 150 Bulgarians, Servians and Montenegrins, 1,179 Cubans, 2,602 Greeks, 6,308 Italians, 135 Lithuanians and 17, 602 Mexicans. In the case of Mexicans, the total number entering this year was slightly greater than either 1916 or 1917, but in the case of all others the 1918 emigration was only five to thirty per cent of that in 1916.

The Railway Business Association, through its general executive committee, has postponed the date of the annual meeting, which, under the by-laws, is to be held, if feasible, in December. The date has not yet been fixed, but it will not be earlier than January and will be held in Chicago. There will be a dinner conforming to whatever suggestions may be obtained from the food administrator; the cost of such dinner to be met by subscription of members for themselves and their invited guests; no officers of railway corporations or officers of the United States Railroad Administration to be invited, the design being to assemble distinctively an audience of railway supply men.

INTERESTING DATA ON RAIL RENEWALS

Some interesting information on rail renewals over a long period of years has been made public by the Committee on Economics of Railway Location of the American Railway Engineering Association. The table was taken from a report of some investigations on the Pennsylvania Lines as presented by Robert Trimble, chief engineer of construction. It shows the number of renewals on all main tracks in 159 miles during a period of 31 years, for track on tangent and on various degrees of curvature.

RAIL RENEWALS ON TANGENTS AND CURVES ON THE PITTSBURGH, FORT WAYNE & CHICAGO, FOR ALL MAIN TRACKS FROM ROCHESTER TO CRESTLINE

Alinement	Average length of track	Length of track renewed in 31 years	No. of renewals in 31 years	Average life	Ratio of renewals (tangent being = to 1)
Tangent	1,037,633	2,988,561	2.88	10.76	1.00
Curve 0° to 1°....	117,107	332,539	2.84	10.90	0.99
Curve 1° to 2°....	157,323	510,289	3.24	9.57	1.12
Curve 2° to 3°....	79,847	267,823	3.35	9.25	1.16
Curve 3° to 4°....	46,382	186,291	4.01	7.73	1.39
Curve 4° to 5°....	34,819	153,764	4.42	7.04	1.53
Curve 5° to 6°....	4,580	24,146	5.27	5.90	1.82

TRACK MATERIALS IN FRANCE

Following the signing of the armistice, information has become available concerning the vast quantity of track material supplied to the American Expeditionary Forces during our participation in the world war. Very shortly after the declaration of war, S. M. Selton, president of the Chicago Great Western, was requested by the war department to go to Washington and assume responsibilities for the organizing of equipping of regiments of American railway men to construct, operate and maintain military lines in France during the period of the war. While considerable information was given out from time to time concerning the recruiting of these regiments and their departure overseas, and although some data has been available concerning rails and other track materials sent abroad, no information in complete form has been available up to the present concerning the total quantities of materials supplied. For this reason, the list of these given below affords the first opportunity for judging of the extent of the operation of the American railway forces in France. 80-lb rails, 251,000 tons; 25-lb. rails, 17,053 tons; 67½-lb. Russian rail, 47,955 tons; fabricated track, 45,159 tons; angle bars, 14,668 tons; track bolts, 13,393 tons; track spikes, 6,281 tons; turnouts, 9,622 tons; clip switches, 3,261 tons; total, all classes of materials, 464,650 tons.

PERSONAL MENTION

CORPORATE

W. E. Nicholson, assistant to chief engineer of the Norfolk Southern, at Norfolk, Va., has been appointed chief engineer for the corporation.

Samuel T. Wagner, chief engineer of the Philadelphia & Reading, has been appointed chief engineer for the corporate company, with headquarters at Philadelphia, Pa.

A. F. Rust, valuation engineer of the Kansas City Southern, has been appointed consulting engineer for the corporation, with headquarters at Kansas City, Mo.

J. M. Brown, engineer of water service of the Chicago, Rock Island & Pacific, has been appointed corporate engineer of maintenance and construction, with headquarters at Chicago.

D. W. Gross, valuation engineer of the Atlantic Coast Line and the Charleston & Western Carolina, has been appointed corporation engineer of those companies, with headquarters at Wilmington, N. C.

GENERAL

J. A. Gillies, district engineer of the Atchison, Topeka & Santa Fe, western lines at La Junta, Colo., has been appointed trainmaster at Dodge City, Kan.

Malcolm Hugh MacLeod, general manager and chief engineer of the Canadian Northern, lines west of Port Arthur, with office at Winnipeg, Man., has been appointed vice-president in charge of operation, maintenance and construction, with jurisdiction over all lines, with headquarters at Toronto, Ont. Mr. MacLeod was born on July 13, 1857, at Isle of Skye, Scotland, and received his education at Franklin, Pa. He entered railway service as a chainman and rodman with the Victoria Railway in 1878. In the following year he joined the parties of the Credit Valley Railroad, now a part of the Canadian Pacific, as rodman and assistant engineer on construction. In 1881 he became transitman on location surveys on the Ontario & Sault Ste. Marie, and the next year was assistant engineer on construction with the Toronto & Ottawa. In 1883, he went with the Canadian Pacific and served on various construction and location projects. He became chief engineer of the Temiscamingue Railway in 1894 and held this position until 1897, when he was made assistant chief engineer and later chief engineer of the Crows Nest Pass Railway. In 1900 he went to the Canadian Northern as chief engineer of the lines west of Port Arthur, and in 1907 was made, in addition, general manager, which position he held at the time of his appointment, as noted above.

ENGINEERING

R. E. Van Atta, principal assistant engineer of the Kansas City Southern, has had his jurisdiction extended to include the Missouri & Northern Arkansas, with headquarters at Kansas City, Mo.

I. A. Cottingham, chief engineer of the Southern Pacific Terminal Company and the Galveston Wharf Company, with office at Houston, Tex., has had his jurisdiction extended to include all Galveston terminals.

A. J. Wharf, chief engineer of the Peoria & Pekin Union, has been appointed assistant chief engineer of that road, the Chicago & Alton, the Chicago, Peoria & St. Louis and the Peoria Railway Terminal, with headquarters at Peoria, Ill., as in the past.

Fullerton P. McGough, manager of the Pittsburgh office of the North American Railway Construction Company, Chicago, has been appointed division engineer of the Baltimore & Ohio, with office at Grafton, W. Va., succeeding **G. F. Eberly,** who has been transferred to the construction department, in charge of construction on the line between Connellsville and Fairmont.

E. A. Whitman, chief engineer of the Minneapolis, St. Paul & Sault Ste. Marie, with headquarters at Minneapolis, Minn., has had his authority extended over the Lake Superior Terminal & Transfer Railroad.

C. F. Loweth, chief engineer of the Chicago, Milwaukee & St. Paul, the Escanaba & Lake Superior and the Ontonagon Railroad, with headquarters at Chicago, has had his jurisdiction extended to include the Port Townsend & Puget Sound.

W. H. Brown, division engineer of the Pennsylvania Railroad, Western Lines, with headquarters at Zanesville, O., has had his authority extended over the Ohio River & Western Railroad. **F. A. Collar** has been appointed assistant division engineer of the Ohio River & Western Railroad, effective November 1.

S. A. Jordan, assistant division superintendent of the Baltimore & Ohio, with office at Brunswick, Md., has been appointed engineer maintenance of way of the Baltimore & Ohio Railroad, Eastern Lines, and the Coal & Coke Railroad, with headquarters at Baltimore, Md., succeeding **J. B. Myers,** assigned to other duties.

R. B. Stokley, acting engineer maintenance of way on the Cincinnati,Sandusky division of the Cleveland, Cincinnati, Chicago & St. Louis, with office at Springfield, Ohio, has been transferred to the Peoria & Eastern division in the same capacity, with headquarters at Indianapolis, Ind., to succeed **L. B. Elliott,** who takes the place of Mr. Stokley. A sketch of Mr. Stokley appeared in the August issue of the *Railway Maintenance Engineer,* page 280.

Edward Gagel, chief engineer of the New York, New Haven & Hartford, has had his jurisdiction formally extended over the Central New England, the New York Connecting, the Wood River Branch Railroad, the Union Freight Railroad, the Narragansett Pier Railroad, the Boston Terminal, the New England Steamship Lines, the Hartford & New York Transportation Line and the New Bedford, Martha's Vineyard & Nantucket Steamship Line.

J. T. Wilson, district engineer of the Baltimore & Ohio, with office at Baltimore, Md., has been appointed consulting engineer of the Baltimore & Ohio Eastern Lines, the Coal & Coke, the Wheeling Terminal Railroad, the Western Maryland, the Cumberland Valley, and the Cumberland & Pennsylvania. **A. C. Clarke** has also been appointed district engineer.

E. F. Mitchell, chief engineer of the Texas & Pacific, the St. Louis Southwestern of Texas, the International & Great Northern (excluding line from Spring to Ft. Worth and Madisonville branch), the Trinity branch of the Missouri, Kansas & Texas of Texas, the Beaumont & Great Northern, the Galveston, Houston & Henderson, the Houston & Brazos Valley, the Trans-Mississippi Terminal and the Weatherford, Mineral Wells & Northwestern, with office at Dallas, Tex., will also have jurisdiction over the Dallas Terminal Railroad & Union Depot.

Daniel E. Helvern has been appointed district engineer of the Northern district of the Atchison, Topeka & Santa Fe, with headquarters at La Junta, Colo., succeeding **J. A. Gillies,** appointed trainmaster at Dodge City, Kan., as noted elsewhere. Mr. Helvern was born at Beattie, Kan., on November 10, 1878, and entered the service of the Santa Fe on April 23, 1901, and served consecutively as chainman, rodman and transitman with that road. In January, 1907, he was appointed division engineer, with headquarters at Pueblo, which position he held until he received the appointment, as noted above.

Thomas L. Phillips, who has been appointed division engineer of the Western Pacific, with headquarters at Sacramento, Cal., as announced in last month's issue, was born in Oregon on December 28, 1881. He entered railway service with the Atchison, Topeka & Santa Fe in the capacity of chainman in 1900, and was promoted to levelman in 1903 and transitman in 1904. Mr. Phillips left that road in 1905 and entered the service of the Western Pacific as resident engineer. In 1908 he was promoted to assistant engineer, a position he held until appointed division engineer, as noted above.

N. L. Arbuckle, resident engineer on the Cleveland, Cincinnati, Chicago & St. Louis, at Columbus, Ohio, has been appointed acting engineer maintenance of way of the Indianapolis Terminal division, with headquarters at Indianapolis, Ind., succeeding **I. M. Brown,** deceased. Mr. Arbuckle was born on April 20, 1883, at Indianapolis, Ind., and graduated from Purdue University in 1906. Three years later he entered railway service with the Cleveland, Cincinnati, Chicago & St. Louis, occupying various positions in the engineering corps, Chicago division, in turn. In 1913 he was appointed assistant engineer and two years later served as pilot in connection with the physical valuation of railroads. Upon completing this work he returned to the maintenance of way department, holding his former position of assistant engineer until 1917, when he was appointed resident engineer on track elevation and other work at Columbus, Ohio, which position he held until his recent promotion.

Charles P. Richardson, formerly assistant engineer of track elevation on the Chicago, Rock Island & Pacific, with headquarters at Chicago, has been appointed engineer of water service, with the same headquarters, succeeding J. M. Brown, promoted to corporate engineer, as noted elsewhere. Mr. Richardson was born on December 27, 1882, at Concord, N. H., and graduated from Dartmouth College in 1907. He entered railway service with the Missouri Pacific the same year as an assistant on the engineering corps, later holding consecutively the positions of assistant division engineer and investigator on special work in the office of the chief engineer. In August, 1912, he left the Missouri Pacific and entered the service of the Chicago, Rock Island & Pacific as assistant engineer of track elevation, a position he held for over six years.

Arthur Crumpton, assistant valuation engineer of the Grand Trunk lines in Maine, New Hampshire, Vermont, New York, Michigan, Indiana and Illinois, whose appointment as valuation engineer of the Grand Trunk Railway System, with office at Montreal, was announced in these columns last month, entered the employ of the Grand Trunk in 1889, serving as rodman and draftsman on the Northern and Northwestern divisions until 1893. From 1893 to 1895 he served as assistant engineer, Great Western division on general maintenance work, and from 1896 to 1901 he was assistant engineer attached to the headquarters staff at Montreal, in charge of field and office work in connection with permanent renewals of more than 300 bridges, including the Victoria bridge over the St. Lawrence river. From 1902 to 1906 he had charge of surveys, estimates and building branch lines and double track, and from 1907 to 1915 of location surveys for new lines and revisions in Indiana, Michigan, Ontario, Quebec, Massachusetts and New York. In 1916 he was appointed assistant valuation engineer, which position he held until his recent appointment as valuation engineer, as noted above.

ARTHUR CRUMPTON

Elmer Lawrence Collette, whose appointment as district engineer of the St. Louis-San Francisco, at Springfield, Mo., was anounced in the November issue of the *Railway Maintenance Engineer,* was born at Bevier, Mo., on August 26, 1886. He entered railway service in June, 1906, but left to attend school and graduated from the University of Michigan in 1910. He re-entered railway service in June, 1910, as a transitman with the St. Louis-San Francisco, and since that time has been in continuous employment with that road. He has held various positions, including that of concrete inspector, draftsman, rail inspector, transitman, ballast inspector, office engineer and assistant engineer. He was holding the last named position when appointed district engineer, as noted above.

John A. Lahmer, whose appointment as district engineer of the Missouri Pacific, with headquarters at St. Louis, Mo., was announced in the November *Railway Maintenance Engineer,* was born at Topeka, Kan., on May 28, 1873. He graduated from the University of Kansas in 1895, and entered railway service with the Pittsburg & Gulf Railroad, at Sallisaw, Okla., as an axman on construction work, in October of the same year. After serving as chainman and rodman, he was made chief clerk in 1898 to the engineer maintenance of way of the Kansas City, Pittsburg & Gulf, the Kansas City & Northern Connecting Railway, the Omaha & St. Louis and the Quincy, Omaha & Kansas City. The next year he was levelman on location and division engineer on construction of the extension of the Louisiana & Arkansas south from Sibley, La. In 1900 he went to the Kansas City Southern, and remained with this road until 1910, serving successively in the positions of assistant engineer, office engineer and principal assistant engineer in charge of maintenance and improvement work. From 1910 until 1913 Mr. Lahmer was in charge of location surveys in various parts of the country, and in April, 1914, he entered the service of the Missouri Pacific as assistant engineer in the chief engineer's office. He later became principal assistant engineer in charge of water service, river protection and drainage matters, which position he held when appointed district engineer, as noted above.

JOHN A. LAHMER

Richard Mather, district engineer on the Baltimore & Ohio, with headquarters at Huntington, W. Va., has been appointed district engineer of the consolidated territory comprising the Huntington districts and the Baltimore district, with headquarters at Baltimore, Md. Mr. Mather was born October 3, 1877, in New Haven, Conn. He was educated in Sheffield Scientific School, Yale University, graduating in 1897. He began railway work as axeman on construction with the Chicago & North Western in April, 1898. Subsequently he served as instrumentman and resident engineer, and in January, 1902, he resigned to become a resident engineer with the Chicago Great Western on the extension of the Macon City & Fort Dodge from Fort Dodge to Omaha. On completion of this project he obtained a position of assistant engineer with the Chicago, Burlington & Quincy, with headquarters at Chicago. In May, 1905, he went to the Erie in charge of the construction of the Genessee River Railroad, a low-grade cutoff between Cuba, N. Y., and Hunts. On the completion of this work he entered the employ of the Baltimore & Ohio as assistant engineer in charge of surveys and studies of the Eastern Ken-

RICHARD MATHER

tucky and Southern West Virginia coal field in connection with the Baltimore & Ohio entry into that territory. On January 1, 1916, he was appointed district engineer at Huntington, where he remained until the consolidation of this territory with the Baltimore district.

J. L. Haugh, engineer of capital expenditures in the office of the North Western Regional Director, has been appointed engineering assistant to the regional director, with headquarters at Chicago, to succeed Ralph Budd. Mr. Haugh has been discharging the duties of the engineering assistant since Mr. Budd's resignation several months ago. **C. E. Cox,** of the valuation department of the Chicago, Milwaukee & St. Paul, has been appointed engineer of capital expenditures in the office of the engineering assistant to succeed Mr. Haugh.

BRIDGE

W. F. Rech, of the bridge department of the Chicago & Alton, has been appointed bridge engineer, succeeding J. W. Reid, who has resigned, as noted in these columns last month.

C. S. Heritage, bridge engineer, of the Kansas City Southern, with headquarters at Kansas City, has had his jurisdiction extended over the Missouri & North Arkansas.

PURCHASING

W. S. Galloway, purchasing agent of the Baltimore & Ohio system, with headquarters at Baltimore, Md., has had his jurisdiction extended to include the Chicago Heights Terminal Transfer.

E. T. Stone, purchasing agent of the Minneapolis, St. Paul & Sault Ste. Marie, with office at Minneapolis, Minn., has had the Lake Superior Terminal & Transfer Railroad included in his jurisdiction.

N. P. Randolph, purchasing agent of the Southern Pacific Terminal Company and the Galveston Wharf Company, with headquarters at New Orleans, La., will also have authority over all Galveston terminals.

O. H. Wood, assistant purchasing agent of the Great Northern, at Seattle, Wash., has been appointed purchasing agent of the Pacific Coast Railroad, with the same headquarters, succeeding **G. W. Saul.**

W. A. Linn, purchasing agent of the Chicago, Milwaukee & St. Paul, the Escanaba & Lake Superior and the Ontonagon Railroad, with headquarters at Chicago, has had his jurisdiction extended to include the Port Townsend & Puget Sound.

R. L. Irwin, purchasing agent of the Texas & Pacific and all other lines under the authority of **J. L. Lancaster,** federal manager, with headquarters at Dallas, Texas, also becomes purchasing agent of the Weatherford, Mineral Wells & Northwestern.

Paulino López, purchasing agent of the Constitutionalist Railways of Mexico, with office at Mexico, Mex., has resigned, and his former position has been abolished; **Augustus Herrera** succeeds Mr. López, with the title of assistant to the general purchasing agent, taking charge of all matters heretofore handled by the former. Mr. Herrera was formerly purchasing agent for the National Railways of Mexico, having resigned that position when the Constitutionalists Railways of Mexico took full control of the railway lines in Mexico.

OBITUARY

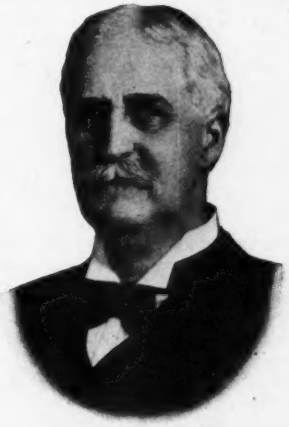
W. G. Dungan, assistant superintendent of the Chicago, Burlington & Quincy, with headquarters at Deadwood, S. D., and formerly a roadmaster on that system, died on October 22.

Chester P. Siems, chairman of the Siems-Carey Railway and Canal Company, died on October 23 at his home in New York City, at the age of 33. In 1907 he entered the engineering department of the Spokane, Portland & Seattle, and in the fall of 1908, left the railroad company and joined his father in forming the firm of Siems & Co., which carried out some large contracts on the Great Northern and the Northern Pacific.

A. N. Bullitt, formerly assistant chief engineer of construction of the St. Louis-San Francisco, and recently engaged in municipal improvement work in Memphis, Tenn., died in that city on October 8. Previous to 1904 Mr. Bullitt was resident engineer in charge of construction of the Arkansas River bridge at Little Rock, Ark., and later became chief engineer of construction of the Mobile, Jackson & Kansas City and the Gulf & Chicago.

I. M. Brown, engineer maintenance of way of the Cleveland, Cincinnati, Chicago & St. Louis Ry., at Indianapolis, Ind., died October 3. He was born at Waynesboro, Pa., February 3, 1882. His service with the railway began in 1907, as an instrumentman. He was successively inspector, supervisor of track, assistant engineer maintenance of way on the Chicago and Cincinnati divisions, and then engineer maintenance of way of the Indianapolis Terminal division.

Albert A. Robinson, formerly president of the Mexican Central and vice-president of the Atchison, Topeka & Santa Fe, who died at Topeka, Kan., on November 9, 1918, played an important part in the building of the Santa Fe system. He was born at South Reading, Vt., on October 21, 1844, and graduated from the University of Michigan in 1869. He entered railway service the same year with the St. Joseph & Denver City as an axman. In April, two years later, Mr. Robinson entered the employ of the Santa Fe, then a road scarcely 100 miles long. When he left the system 22 years later it covered more than 9,000 miles. Mr. Robinson's first work with the Santa Fe was on surveys and construction between **Topeka and Atchison.** He became chief engineer in 1873 and also held the positions of division superintendent, superintendent of bridges, building and water service, assistant general superintendent, general manager, second vice-president and vice-president. In May, 1893, he resigned to become president of the Mexican Central, which position he held until his retirement in 1906 because of ill health.



ALBERT A. ROBINSON

RAILWAY EMPLOYEES AND THE LIBERTY LOAN

According to final reports prepared by the railroad administration, the employees of the roads operated under the supervision of Director General McAdoo subscribed $184,868,360 to the Fourth Liberty Loan. This compares with $106,655,450 subscribed in the third loan, an increase of $78,212,850. The honors for the campaign belong to the Southwestern region, 99.1 per cent of the 170,333 employees of that region having subscribed for a total of $21,487,650, an average of $126 per subscriber. The Eastern region, the largest of the seven, led in the total subscribed with $54,697,200.

The totals in detail follow:

Region	Number subscribers	Percentage employees	Amount subscriptions	Amount per subscriber
Administration Headquarters (Wash.)	1,014	100.	$ 502,000	$495.10
Eastern	532,173	96.	54,697,200	102.00
Southwestern	170,333	99.1	21,487,650	126.00
Central Western	307,546	96.69	36,082,850	120.58
Pocahontas	48,954	87.23	4,380,550	89.48
Southern	184,035	78.	16,253,200	88.00
Allegheny	291,985	94.86	23,611,100	80.86
Northwestern	248,165	97.92	27,853,750	112.24

In the Eastern region final returns of subscriptions to the Fourth Liberty Loan by officers and employees of the 48 railroads reported to Regional Director A. H. Smith, Grand Central Terminal, show that 98 per cent of all employees subscribed, the average amount per subscription being $102.

CONSTRUCTION NEWS

The Boston & Albany has prepared tentative plans for a new passenger station at Springfield, Mass. The plans call for building a new passenger station and office building, a passenger subway, a baggage and express subway, and a building to accommodate the baggage, mail and express business separate from the passenger station building. There will be eight through and one stub end station tracks, with platforms 20 ft. wide, and a Bush train shed covering all tracks and platforms. Two all-electric interlocking plants will be provided at each end of the station. A new outbound freight house will also be provided at the Liberty street local delivery yard, and the yard will be reconstructed to increase its capacity. The cost of the proposed improvements will be about $2,500,000, none of which is to be spent for the purchase of land.

The Baltimore & Ohio Chicago Terminal has given a contract to the Drumm Construction Company, Chicago, for building an extension to the roundhouse at Burley Avenue and East Eighty-seventh street, Chicago; the existing 15 stalls 70 ft. in length will each be extended 33 ft. The addition will be of reinforced concrete, steel and brick construction, and will be equipped with drop pits and a new heating system. The same contractor will build a two story brick and reinforced concrete toilet and locker building 24 ft. by 81 ft. at the same location. The cost of the entire work will be about $140,000. The road also contemplates the construction of a cinder pit to cost about $10,000.

The Canadian Northern has awarded a contract to Claydon Company, Ltd., Winnipeg, Man., for a new brick station at Rainy River, Ont. It is to be two stories high and 129 ft. long by 30 ft. wide and will cost about $30,000.

The Chicago & Alton has awarded a contract to Mulvill Bros., Alton, Ill., for the grading of 12.2 miles of second track on the main line between Renicker, Ill., and Nilwood. Tracklaying will be done by the company's own forces.

The Chicago & North Western will soon construct a passenger station and subway at Great Lakes, Ill., the aggregate cost of which is estimated at $200,000. The station will be a one-story frame stucco building, with basement and composition roof, 110 ft. by 30 ft. The subway will be constructed of reinforced concrete. This will have a width of 66 ft. and will pass under the tracks of the Chicago & North Western and the Chicago, North Shore & Milwaukee. John Marsch, Chicago, has the contract for the subway and J. A. Sackley & Co., Chicago, the contract for the excavating. The contract for the station building has not yet been let. The road's own forces will construct the retaining wall.

The North Western is also building a roundhouse and a repair shop addition at Ashland, Wis., the contract for which was awarded to L. O. Peppard, Minneapolis, Minn.

The Chicago, St. Paul, Minneapolis & Omaha 23-stall enginehouse at Itasca, Wis., was badly damaged by fire recently, 15 stalls being completely destroyed. These will be rebuilt at once, contract having been awarded to Peppard & Fulton, Minneapolis, Minn., and Duluth.

The Cornwall Railroad has awarded a contract to J. H. Greiner, Lebanon, Pa., for building a machine shop extension at Twenty-second and Gulford streets, Lebanon, Pa. The building will be 25 ft. high, 60 ft. wide and 140 ft. long of brick and iron construction and will cost about $25,000.

The Detroit, Toledo & Ironton has given a contract to the Crowell-Lundoff-Little Co., Cleveland, Ohio, to build an eight-stall engine house and machine shop at Napoleon, Ohio; the cost of the structure will be about $80,000.

The Grand Trunk Pacific is now making the following improvements at Edmonton, Alta.: Four-stall extension to the roundhouse; 10,000 ft. of additional trackage in the repair yard; 5,400 ft. of additional trackage in the freight yards, and a 11,000-ft. extension to the storage tracks.

The Illinois Central has awarded a contract to A. W. Stoolman, Champaign, Ill., for the construction of a one-story frame freight house, 200 ft. by 40 ft., and the alteration of a passenger station at Benton, Ill. A platform will be constructed on one side of the freight house, 18 ft. by 200 ft. The improvements will cost approximately $30,000.

The Illinois Central will also build additions on each end of an ice house at Waterloo, Iowa, which will increase the capacity of the structure by 5,000 tons. The cost of the additions will be about $27,000.

The road plans to build a frame enginehouse, 38 ft. by 240 ft., at Birmingham, Ala., to provide space sufficient for four Mallet locomotives.

The road is also calling for bids on a combination freight and passenger station, 34 ft. by 192 ft., to be constructed at Dawson Springs, Ky. The building will be of brick and frame construction with a slate roof. It will have a brick platform running the whole length of the structure on the track side, which will be covered with a canopy, with a composition roof. At one end a heavy timber freight platform, 60 ft. by 34 ft., will be constructed. The building will be provided with a steam heating plant. The cost of the work is estimated at $30,000.

The New York Central has given a contract to the R. W. Smith Corporation, New York, to build four yard offices of frame construction at Syracuse, N. Y. One of the offices is to be a two-story building, 36 ft. high, 30 ft. wide and 60 ft. long, and the other three are to be one-story buildings, 18 ft. high, 25 ft. wide and 41 ft. long.

The Oregon-Washington Railroad & Navigation Company is building a freight house at Walla Walla, Wash., to replace one destroyed by fire last July. It will be of frame construction, with concrete foundation, and will cost about $25,000.

The Ogle Construction Company has received a number of contracts for coaling stations on various railroads. It will build a 150-ton capacity frame station on a concrete foundation for the Colorado & Southern at Ft. Collins, Colo., and a station of like capacity for the same road at Trinidad, Colo. These stations will cost about $18,000 each. It will also build similar stations for the Ft. Worth & Denver City at Amarillo, Tex., Childress and Wichita Falls. It has orders from the Cleveland, Cincinnati, Chicago & St. Louis for a 400-ton station, with a steel substructure and a timber superstructure, at Ansonia, Ohio, and a 100-ton timber station on a concrete foundation at Sheff, Ind. At Nelson, Ill., it will build a 350-ton timber station on a concrete foundation for the Chicago & North Western. The station will include a 300-ton coal pocket on one side of the four main line tracks and a 50-ton pocket on the other side, with an auxiliary conveyor connecting them. The company has orders from the same road to build 150-ton stations with frame superstructure and concrete foundation at Casper, Wyo., Scribner, Neb., and Onawa, Iowa.

The Pennsylvania Railroad has given a contract to Roydhouse Arey & Co., Philadelphia, Pa., to build a frame roundhouse at Emporium Junction, Pa. The work is now under way and will cost about $60,000.

The Pennsylvania Railroad has received authority to build a 50-pit locomotive repair shop at Marietta, Pa., at an estimated cost of $5,000,000. Plans for the work are rapidly being formulated and it is expected that the entire plant will be in operation in the early fall of 1919.

The engine house and machine shop of the Pennsylvania at Pitcairn, Pa., now nearing completion, will cost, with the other improvements, about $1,500,000. The engine house is semi-circular and contains 34 stalls and there are three drop tables. This is a reinforced concrete building. The machine shop is 54 ft. x 120 ft., and is of steel. There are two turntables, each 110 feet in diameter, and there is a storehouse of reinforced concrete, measuring 50 ft. x 100 ft. There is also a brick office building two stories high, 40 ft. x 80 ft., also an ice house and an oil house combined, 38 ft. x 77 ft. This building is of reinforced concrete and one story high.

The Pennsylvania Railroad has given a contract to the Brann & Stuart Company, Philadelphia, Pa., for building an

extension to the engine house at Thirtieth street, West Philadelphia, at a cost of about $100,000, and a contract has been given to the William Steele & Sons Company, Philadelphia, Pa., for building an extension to the stalls of the engine house at Forty-sixth street, West Philadelphia, at a cost of about $60,000.

The Pennsylvania Railroad, western lines, has various engine house and shop improvements under construction at Wellsville, Ohio, the plans for which have been prepared in the office of R. Trimble, chief engineer of construction, Pittsburgh, Pa. That office is also directly supervising the work.

The Pere Marquette is building a new yard at New Buffalo, Mich., the plans for which include about 19 miles of track; a 16-stall enginehouse with a 90-ft. truntable; a machine shop and a 250-ton Roberts & Schafer coaling station.

The Philadelphia & Reading is building a one-story store and oil house 85 ft. long, and a master mechanic's office, two stories high, 19 ft. by 38 ft., at Tulip and Somerset streets, Philadelphia, Pa. Pringle Borthwick, Philadelphia, has the contract. The buildings are of concrete and brick and cost about $46,000.

This road has awarded a contract to A. L. Carhart for building a six-track rectangular brick engine house, supported on concrete foundations, at Rutherford, Pa. The building will be 133 ft. wide by 115 ft. long, with extension for fan house, foreman's office and equipment for boiler washing system. The contract also includes the construction of an outside inspection pit, 150 ft. long.

The Raritan River Railroad has awarded a contract to the Austin Company, of Cleveland, Ohio, for the construction of a 12-stall, reinforced concrete engine house; a machine shop, 100 ft. long; a boiler house, and a store house, each 80 ft. long; to be built at South Amboy, N. J., in 100 working days, at an approximate cost of $196,490.

The St. Louis Southwestern will soon commence the construction of a one-story frame passenger station on a concrete foundation, 24 ft. by 156 ft., at Malden, Mo., to be built by company forces at a cost of $6,500.

The St. Paul Union Depot Company has completed the foundations of the headhouse of the St. Paul Union Passenger Station and has started work on the superstructure. The headhouse will be 150 ft. by 300 ft., with an adjoining waiting room, 80 ft. by 400 ft., extending over the tracks. The total number of tracks which will enter the terminal will be 22. In addition, the project involves the construction of 12 miles of tracks, 500,000 cu. yd. of grading and the erection of a small engine house. The total cost of the terminal improvements will amount to approximately $11,000,000.

The Southern Pacific is engaged in grading 12 miles of second track out of Bakersfield, Cal., and 10 miles between Tehachapi and Cameron. It will probably be some time before tracklaying is commenced and the major portion of the work will be done next year.

The Southwestern Regional Director has authorized the construction of connections between the municipal bridge at St. Louis, Mo., and the Merchants' Bridge and Terminal Railroad at the west end, and the tracks of the Alton & Southern at the east end, so that in case it is later decided to do so, the bridge can be promptly put into use.

The Terminal Railroad Association of St. Louis has awarded a contract to the Fruin-Colnen Contracting Company, St. Louis, Mo., to construct an engine terminal and a two-story concrete coal hopper with pits at East St. Louis, Ill., which will cost approximately $127,000.

The Union Pacific is building a one-story addition to its present machine shop at Omaha, Neb. The building will be used by the motive power department for assembling and erecting. The estimated cost, including additional machinery, is $500,000.

Hold Your Liberty Bonds.—Some get-rich-quick concerns are endeavoring to persuade patriotic Liberty bond holders to exchange their Liberty bonds for worthless oil or mining stock or other wild cat securities. A Liberty loan bond is the safest investment in the world.

SUPPLY TRADE NEWS

GENERAL

The Austin Company's Washington (D. C.) offices have been moved to 1406 G street, North West. **C. F. Chard,** formerly of the Philadelphia office of this company, will be in charge of this office.

The Chicago Railway Supplies Liberty Loan Committee, of which Charles K. Knickerbocker, vice-president of the Griffin Wheel Company, was chairman, secured subscriptions from railway supply companies amounting to $6,875,000, which was greatly in excess of the quota of $5,270,000 assigned to the committee.

The Cleveland Galvanizing Works Company has changed its name to the Chain Products Company. The new title, it is felt, is more descriptive of the product manufactured, a large part of which is weldless wire chain. There will be no change of officers, F. G. Hodell continuing as president, H. N. Hodell as vice-president and W. F. Schneider as secretary.

The Chicago Pneumatic Tool Company is contemplating the construction of a reinforced concrete plant in Detroit, Mich., which will be five stories in height, with a finished basement, and will cost between $200,000 and $250,000. The structure will be 180 ft. by 60 ft. The company also will build a 45-ft. by 150-ft. extension to the erecting department at its No. 2 plant at Franklin, Pa. The building will be of brick and steel construction and will cost about $30,000. Bids are now being received on these buildings.

The Grip Nut Company announces that all stock in that corporation held by the Hibbard interests have been purchased by others. New officers of the Grip Nut Company have been elected who are as follows: Francis H. Hardy, chairman; William E. Sharp, president; Chester D. Tripp, vice-president; Herman Brassert, vice-president, and Truman F. Miller, secretary and treasurer. The directors of the company are: Frank H. Hardy, chairman; William E. Sharp, Chester D. Tripp, Herman Brassert and Thomas G. Deering. The general offices are at 943 Peoples Gas Bldg., Chicago.

Fairbanks, Morse & Co., Chicago, announces the following changes in the personnel of its organization. **R. H. Morse,** who has been connected with the firm for many years in both the sales and manufacturing departments, has been elected vice-president in general charge of purchasing and traffic and will continue to serve as a director of the company. **C. W. Plank,** general director of sales, has been promoted to vice-president in charge of sales of all factory products. Mr. Plank has been with Fairbanks, Morse & Co. for 33 years, having entered the service as a stenographer. S. W. Hovey, general manager of the Beloit plant of Fairbanks, Morse & Co., has been elected vice-president in charge of general manufacturing at all plants. **W. E. Miller,** first vice-president, has been given the title of vice-president and treasurer, succeeding **F. M. Boughey** as treasurer, following Mr. Boughey's appointment as secretary and controller.

PERSONAL

Lloyd H. Atkinson, vice-president of the Air Reduction Company, Inc., 120 Broadway, New York, has resigned because of ill health due to overwork. He will take an extended vacation before engaging in one of the war service activities.

R. H. Wilson has been appointed assistant to the president of the Walter A. Zelnicker Supply Company, with office at St. Louis. Mr. Wilson has been with the company for years, latterly as Houston representative. He is succeeded there by **E. O. Griffin,** formerly storekeeper and assistant general manager of the International & Great Northern; and more recently, assistant to the president of the St. Louis Southwestern in charge of purchases.

Charles V. Eads, formerly connected with the Sarco Company at Chicago, has become associated with the Lehon Company in charge of its waterproofing department, with headquarters at Chicago.

Roger C. Sullivan has been appointed a director and elected chairman of the board and a member of the executive committee of the Independent Pneumatic Tool Company, Chicago, to fill the vacancies caused by the death of **John P. Hopkins** on October 13.

A. H. Weston, who has been track engineer for the Lackawanna Steel Company, Buffalo, for the past eight years, has resigned to become general manager of the Key-Bolt Appliance Company, Buffalo, manufacturers of a new design of bolt for ship construction and track work.

Charles S. Chadwick, secretary and treasurer of Eppinger & Russell Company, New York, has been appointed general manager, succeeding **Jesse J. Eppinger,** deceased, who was with that firm for a period of over 35 years, during a larger part of which he served at general manager.

Thomas D. Crowley, sales agent of the Madden Company, Chicago, has been appointed assistant general sales agent of the Sellers Manufacturing Company, Chicago. Mr. Crowley was born at Clinton, Iowa, on August 18, 1884. He first entered railway service in 1901, as a timekeeper in the track department of the Chicago & North Western. He was later assistant foreman and extra gang foreman in the same department and in 1907 was appointed assistant roadmaster on the Wisconsin division with headquarters at Milwaukee. In 1909 he was appointed supervisor of materials in the general storekeeper's department at Chicago and subsequently was appointed roadmaster with headquarters at Sparta, Wis. In April, 1914, he went with the Madden Company as sales agent and continued with that firm until his appointment as assistant general sales agent of the Sellers Manufacturing Company, a new position in that firm.

T. D. CROWLEY

John J. Smart, vice-president and director of Rownson, Drew & Clydesdale, Inc., died October 23 of influenza at the age of 43 years. When the firm of W. J. Crouch Co., Inc., was founded, Mr. Smart was one of the original members and served as manager of the engineering division. When Crouch & Co. amalgamated recently with the old English firm of Rownson, Drew & Clydesdale, Mr. Smart was made head of the manufacturing division.

Marshall E. Keig, secretary and treasurer of Harry Vissering & Co., secretary and treasurer of the Okadee Company, and third vice-president of the Charles R. Long, Jr., Company, with office at Chicago, who was given leave of absence in August to enter the Signal Corps of the Army as a private, has been commissioned a second lieutenant in charge of purchases in the West for the Signal Corps, with headquarters at Chicago. A sketch and photograph of Mr. Keig appeared in the *Railway Maintenance Engineer* for October, page 362.

H. D. Megary, assistant to the president of the Chicago Pneumatic Tool Company, with headquarters at Chicago, has been elected secretary, with the same headquarters, succeeding **W. B. Seelig,** resigned. Mr. Megary will continue to act as assistant to the president. **A. M. Brown,** assistant manager of the compressor sales division at New York, has been appointed district manager of sales, with office at Philadelphia, Pa., succeeding **G. A. Barden,** who will remain in Philadelphia as sales representative for the company.

C. D. Morton has left his position as sales engineer for the Page Steel & Wire Company to become a captain in the general engineer depot, U. S. A., at Washington. **Chas. E. Goodnow,** formerly assistant sales manager of the electrical and special wire department of the American Steel & Wire Company, and more recently identified with building construction work in Washington and Brooklyn for the army and navy, is now with the Page Steel & Wire Company. Mr. Goodnow's efforts will be devoted to sales and service on Armco iron welding rods and "Copperweld" electrical wire.

TRADE PUBLICATIONS

Wrought Iron Pipe.—A photomicrograph showing a section of pipe magnified 60 diameters is an interesting feature of a folder recently issued by the A. M. Byers Company, Pittsburgh, Pa. The reason for the rust resisting properties of wrought iron is clearly brought out, and records of installation of Byers pipes are cited in the folder.

Portable Cranes and Hoists.—The complete line of portable floor cranes and hoists manufactured by the Canton Foundry & Machine Company, Canton, Ohio, is listed in a 34-page catalogue issued by that company. The construction and operation of the cranes is described in detail and each type is illustrated and the principal dimensions given.

Hoisting Machinery.—The equipment manufactured by the Brown Hoisting Machinery Company, Cleveland, Ohio, consisting of trolleys, traveling and portable cranes, electric hoists, etc., is presented in a complete and attractive catalogue, No. D-1919, containing 56 pages, 8½ in. by 11 in., and over 100 illustrations. A large amount of data is also given in tabular form as to prices, dimensions and clearances.

Timber Highway Bridges.—The National Lumber Manufacturers' Association has issued an 80-page bulletin, known as Engineering Bulletin No. 3, illustrating and describing good practice in the design and construction of timber highway bridges. The character of the information contained may be secured from the titles of the chapters, namely: The Use of Wood in Bridge Construction; Location and Substructure; Types of Framing; Floors and Wearing Surfaces; Joints and Metal Details; Quality and Kind of Timber Used; The Preservation of Bridge Timber; Plans for Timber Highway Bridges and References.

Track Construction Catalog.—The St. Louis Frog & Switch Company, St. Louis, Mo., has issued a catalog of 280 pages describing and illustrating its complete line of track materials and supplies. Separate pages are devoted to each form and style or size of track appliance, which is fully illustrated. The supplies covered include various types of switches, frogs, crossings, slip switches and manganese track construction for steam railways, electric railways and industrial track use. About 40 pages near the beginning of the book are devoted to practical data on the mathematical properties of turnouts, crossings, curves, etc., together with tables of the quantities of the materials required in track work.

Railroad Water Softening.—The Wm. Graver Tank Works, Chicago, has issued a treatise on the subject of water softening, which consists of a collection of 31 reprints of full-page advertisements appearing in the Railway Age. These advertisements are unusual in that little or no reference is made to any particular make or type of water softener, the material being almost entirely in the nature of a comprehensive exposition of the entire subject. Of particular note are 12 sheets presented in the form of articles covering various phases of this subject, prepared by W. R. Toppan, manager of the railroad department of the Wm. Graver Tank Works. These appear with such titles as "Operating Efficiency Increased by Purifying Water," "Water Softening in Relation to Ton Mileage," and "The Method of Water Treatment Determines the Uniformity of Results." In addition to these 31 pages, there is an 8-page appendix, which consists of a compilation of facts and constants relating to the chemistry and economics of water softening, and serves to combine in a very short space a large amount of information required by the water service engineer in solving the problems arising in his work.